

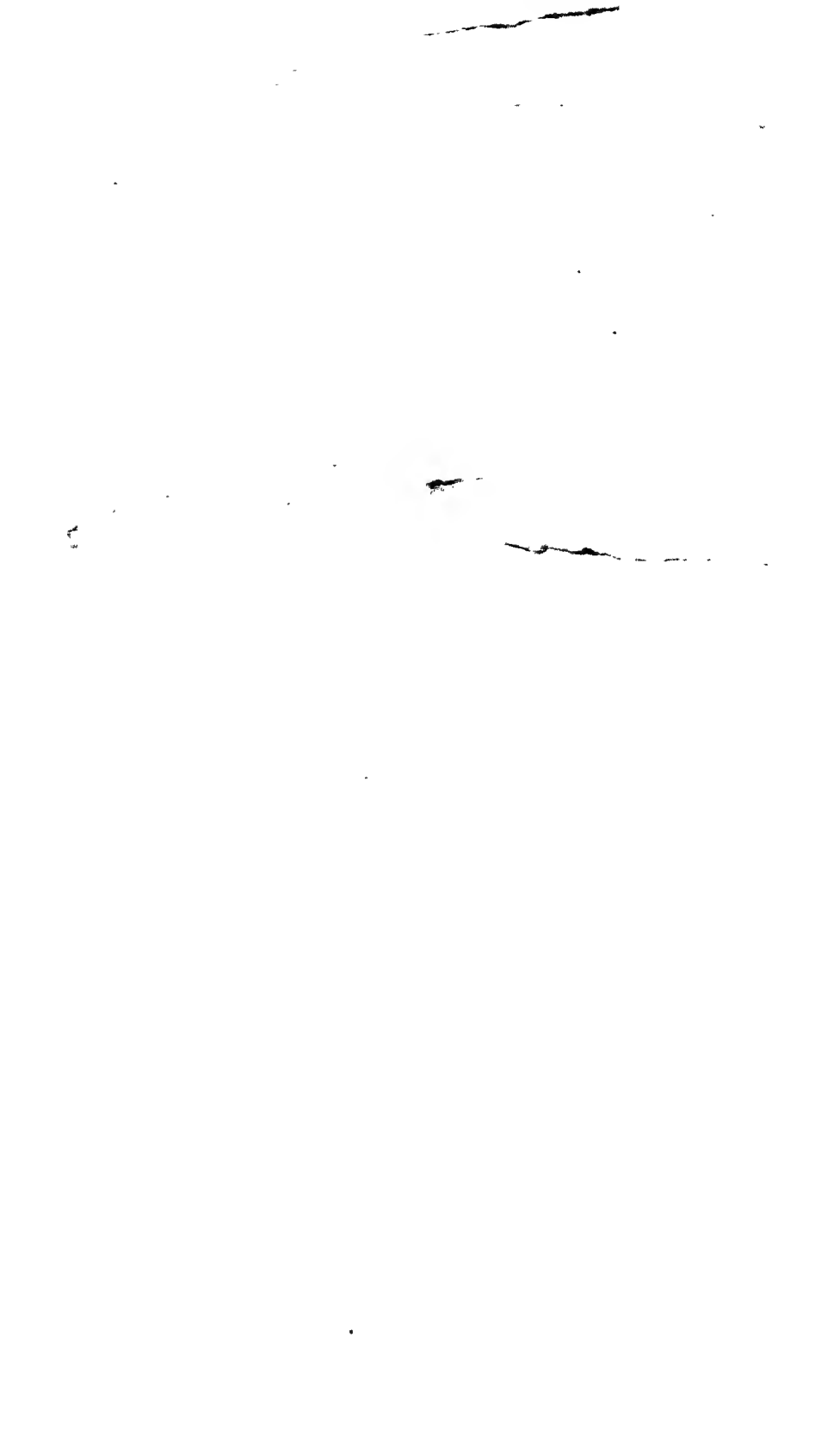
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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND

MONTHLY RECORD OF GEOGRAPHY.



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Authors are alone responsible for their respective statements.

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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

Address on the Opening of the 48th Session of the Society, November 11, 1878.

By SIR RUTHERFORD ALCOCK, K.C.B., VICE-PRESIDENT.

THE unavoidable absence of your President, the Earl of Dufferin, has entailed upon me the duty of taking the Chair on the present occasion, and delivering the Address which is customary on the opening night of the Session. Lord Dufferin's inability to be present was made known to me only a few days ago, allowing very insufficient time to prepare any elaborate paper. But a work of this kind on the opening of the Session is not necessary. The Opening Address was originally not intended to be retrospective but anticipatory, conveying a brief announcement to the Fellows of the prospects of the new Session, the Papers in hand or expected, together with a passing reference to the latest news of any Expeditions in which the Society was interested. Any detailed review of geographical progress and events is perhaps out of place on such an occasion, and otherwise undesirable, as tending to limit the scope of the Annual Address delivered at the Anniversary Meeting in May, in which a careful retrospect of the progress of Geography and leading events forms the principal subject.

The task of reviewing the progress of Exploration on this occasion, however, would in any case have been a light one; inasmuch as few events of much interest have transpired since the Society last met. We have no grand African discovery to announce or comment upon, no Cameron or Stanley being at present in the field. The only salient news from Africa that has lately been received is, unfortunately, of obstacles and misfortunes happening to Expeditions now on their way to the interior. I allude more especially to the important Expedition equipped and directed by the International Commission under the auspices of his Majesty the King of the Belgians. This Expedition, having received a

reinforcement of two officers, MM. Wautier and Dutrieux, sent to replace the two who died at Zanzibar, started for the interior on the 28th of June last, forming a caravan of 408 men. They had reached a point a little beyond Mvomero, only 100 miles or thereabouts from the coast, on the 22nd of July, when the Wanyamwesi porters mutinied, and finally abandoned the party, taking with them the greater part of the stores and goods with which they had been entrusted. Happily no blood was shed, and M. Cambier, the leader, was able some days afterwards to reach Mpwapwa, where the Church Missionary Society have established a station, and organise measures for the further advance of the Expedition.

The emissaries of the great Missionary Societies have been making steady if not rapid progress in various quarters. The Rev. C. T. Wilson, who returned to King Mtesa's early in the year, has recently reported that the reinforcements for the Uganda Mission sent from England by way of the Nile, after the deaths of Lieutenant Shergold Smith and Mr. O'Neill, left Khartum in August, and were expected to arrive at King Mtesa's in October. Other missionaries were on the way to Victoria Nyanza from the direction of Zanzibar. Mr. Mackay, who had travelled by the Unyanyembe route, was reported as having reached a point not many days' journey from the lake on the 4th of June, and Messrs. Stokes and Copplestone had left Mpwapwa for the same destination on the 19th of August.

The party sent to Lake Tanganyika by the London Missionary Society are also advancing steadily towards their destination. After the loss of their draught cattle by the tsetse fly, on the road to Mpwapwa, some time was necessarily lost in the re-organisation of the Expedition on the ordinary system, viz. by the hiring of a large body of native carriers; but the caravan has now reached the capital of King Mirambo, and an advanced party had pushed forward to Ujiji, which place they expected to reach in September last. One of the objects of this Mission, as you are doubtless aware, is to establish a station at the southern extremity of the Lake, and thus approach the establishments of the Scottish Free Church Society on Lake Nyassa, with which it is hoped eventually to open up a line of communication. I am informed that no time will be lost, on the arrival of the first party at Ujiji, in despatching members of the Mission by boat to the southern end of the Lake, which it is thought probable will be reached in January next.

Of other African Expeditions in progress, little of importance has been recorded since we last met in June. I ought, however, to mention that the German Geographical Society, in addition to the Expedition to Central Western Africa, mentioned in my Address, has since sent out another explorer, the well-known traveller Gerhard Rohlfs, with the object of crossing Central Africa from north to south. Herr Rohlfs

intends to make first for the neighbourhood of Lake Chad, starting from Tripoli; and, having reached this point, to make it the basis of a fresh start across the great blank which lies on our maps between Wadai and the middle course of the Congo.

The Expedition to the northern end of Lake Nyassa and thence to the southern end of Lake Tanganyika, determined upon at the June Meeting of the subscribers to the African Exploration Fund, has now completed its preparations, and will leave England in a few days for Zanzibar. As you are aware, the leader chosen by the Committee is Mr. Keith Johnston, well qualified by his acquirements as a scientific geographer to carry out the objects of the Expedition, which are to obtain an exact knowledge of the still unexplored region lying between the recently constructed road near Dar-es-Salaam, south of Zanzibar, and the lakes just mentioned. He has chosen for his assistant and second in command, Mr. Joseph Thomson, a young geologist well recommended by Professor Geikie of Edinburgh, and we feel entire confidence, should they maintain their health and meet with no insuperable obstacles, that a large amount of accurate and valuable information regarding the country, its products, and resources, the best routes to the lakes, and the hydrology and geology of the Lake districts, will be the result of this undertaking.

In other parts of the world, by far the most interesting and important geographical event is the brilliant achievement, of which you have all heard, of the Swedish Arctic Expedition under Professor Nordenskiöld. In my Anniversary Address I entered into some detail regarding the equipment and objects of this bold undertaking, which aimed at nothing less than the solution of the historic problem of a north-east passage from Western Europe to Behring Strait. We have now learnt that the most difficult part of the task has been accomplished, the Expedition having safely rounded Cape Cheljuskine (lat. $77^{\circ} 32' N.$), the most northerly point of Asia, and passed the mouth of the Lena. A telegram conveying this important intelligence reached Mr. Dickson of Gottenburg, the generous patron of the undertaking, on the 17th of October from Irkutsk, having been conveyed thither from the mouth of the Lena, first by a small steamer up the river to Yakutsk, and thence by Russian post to Irkutsk, the nearest station on the Siberian telegraph line, distant about 2400 miles from the anchorage of the Swedish exploring vessel. A distance of 1100 miles remained still to be accomplished before the Expedition reaches Behring Strait, but the whole of it has previously been navigated, and Professor Nordenskiöld had full confidence in his ultimate success, and had even requested letters to be addressed to him at Yokohama.* A Paper on the subject of this remarkable voyage, together with

* We have since learnt (December 19th) that the Expedition is frozen in, near the Liakov Islands, and that M. Sibiriakof has commissioned Captain Sengstake to equip a vessel and carry succour to the party, next spring, via the Pacific and Behring Strait.

another on the Dutch Arctic Expedition of last summer by Mr. Markham, will be read at our Meeting of December 9th, when your President, it is fully expected, will take the Chair.

I take this opportunity of announcing that the Council have for some time had under their consideration, and have this day adopted, a scheme for improving the 'Proceedings' published by the Society, by the insertion of Geographical Notices, Maps, and other matter of general interest derived from various sources independent of the Society, and, by increasing the frequency of the issue, making it, in short, a monthly publication. This change will add to the expense of the publication considerably, but not more, it is hoped, than will be compensated by the increased value and attractiveness of the publication to the Fellows of the Society (who will receive the numbers free by post as heretofore), and to the public generally, thus contributing materially to the diffusion of Geographical knowledge over a wider area.

The programme of Lectures on the Scientific branches of Geography agreed upon for the present Session is as follows :—At an early Meeting after Christmas, Professor A. Geikie of Edinburgh will deliver a lecture on "Geographical Evolution." At a Meeting not yet definitely fixed, before or after Easter, Mr. J. Ball, F.R.S., will address us on the subject of "The Flora of the European Alps, and its connection with that of other regions of the Earth." The concluding lecture will be delivered in May by Professor Rolleston, on "The Modifications of the external aspects of Organic Nature produced by Man's interference."

Journeys up the Fly River and in other parts of New Guinea.

By L. M. D'ALBERTIS.

Map, p. 80.

(Read at the Evening Meeting, November 11th, 1878.)

DURING the past six years it has been my good fortune to explore a considerable portion of the interior of New Guinea, a land of which nothing until quite recently was known, except a few districts in the immediate neighbourhood of the coasts. The object I had in view was not Geography, but Natural History. I had opportunities, however, of noting the more salient points in the topography of the regions visited, and whilst on the Fly River, up which I made three separate voyages, I compiled a chart of the river. I also made observations on the ethnology of the island. To a Society which has been accustomed to listen to the exploits of great travellers in the interior of Africa, I am afraid my narrative of work in this much humbler field will prove of little interest.

The island of New Guinea extends from a few minutes south of the Equator to 10° south lat., thus lying nearly in the centre of the tropical zone. Its most southerly part strongly resembles, in its physical

features, the north of Australia, from which it is only separated by a narrow and shallow channel of about 80 miles in width. To my mind there appears no doubt that, at no distant date in geological time, New Guinea formed part of Australia, which it resembles so curiously in its types of plants and animals, both regions in this respect being sharply distinguished from all other lands on the globe. A very small elevation of the sea-bed in Torres Straits, not more than about 60 feet, would bridge over the interval between these two great land areas.

It is my opinion, indeed, that at some future date New Guinea will again form an integral part, geographically, of Australia, to which in all probability it will also be united politically.

To attain its object Nature need not here employ great agencies like subterranean upheaval, but only the modest but laborious and industrious operatives which are now at work. It will be the polypus and corals which will gradually unite in one those two largest islands in the world. That they were once united is apparent to me from the peaks and islands of the Torres Straits, which extend like the links of a chain from the north of Australia, i. e. Cape York to New Guinea. It is also evident from the shallowness of the narrow channel; and the study of the fauna and flora, both living and fossil, abundantly proves it. In the centre of the island, at the foot of the high volcanic chain which forms the backbone of this large island, there are fossil remains of marine-animals and corals of recent date which clearly show us that this part of the country, after having undergone a period of subsidence, the one most probably which caused its separation from Australia, has recommenced to rise by a slow process which is likely to be continuous.

It is only a few years ago that a mysterious veil hung over this remote land, but the hour of its lifting has now struck, and from various sides the unknown land is being penetrated by Europeans. The pioneers in this work, I am proud to say, have been the naturalists who, excited by the desire of studying the marvellous and extraordinary fauna, first ventured into the unhealthy forests and risked their lives among the indigenous tribes supposed to be savages and cannibals. These were followed by gold explorers from New South Wales, and thus the work will soon be completed, and New Guinea will no longer be a sealed book. As I have already said, I do not present myself to you as a geographer, or even as a scientific naturalist, but wish rather to be regarded as one of those pioneers who have opened the way to more able successors.

Having been attracted by the marvellous accounts of the Papuan territory, and the beauty of the animals of that mysterious island, particularly those given by the distinguished naturalist Wallace, I accepted as a piece of good fortune the offer to accompany Dr. O. Beccari in one of his voyages of exploration to New Guinea in 1872. We attempted first to land at a spot on the south-western coast, about $136^{\circ} 15'$ E. long. and $4^{\circ} 40'$ S. lat., hoping to penetrate into the interior by a river (the

Wamuka), which there disembogues itself, and reach the high mountains which figure on the map under the name of the Charles Louis Range; but the winds, owing to the advanced season of the year, prevented us carrying it out, and we were compelled to search in another direction for a landing-place more suitable to our purpose. We touched at several points on the coast, travelling in a north-westerly direction, but we did not finally land until the 1st of May, on Sorong, a small island situated between Salwatti and the mainland of New Guinea, in about $0^{\circ} 52'$ S. There we commenced to make a collection of plants and animals, but, finding the locality extremely unhealthy, we were soon compelled to migrate to a better place, and we decided finally on going to Dorei, a small trading settlement in the north-western peninsula. It is in reference to this extreme point of New Guinea that Wallace wrote his account of New Guinea in the second volume of his 'Malay Archipelago,' and his eloquent description of the birds of paradise in that work inspired me with the desire of visiting it. After quitting Sorong we arrived in the early part of August at Andai, a village a few miles distant from Dorei, where a Dutch Evangelical Mission had its headquarters. During our stay in this part I explored the country to the foot of the high chain of mountains named Arfak, but here I only found birds of a common and uninteresting kind. The species which fill the naturalist with admiration, although known only from mutilated specimens, were to be found high up the mountains; whence it was impossible to obtain them, owing to the fear the coast natives have of the mountain tribes, who are reputed to be cannibals. No one, in fact, had been able to penetrate to the Arfak highlands, and it is doubtful if the attempt had ever been made.

The Arfak Range is most probably of volcanic origin. The height of the highest summit, called Mount Arfak on the charts, is estimated at 9000 feet, which I believe is not an exaggeration, as I could judge pretty well from the altitude attained by myself on Mount Hatam, viz. 5000 feet. From this spot the range runs uninterruptedly in a southerly direction, and joins the range of mountains which constitute the chief part of the backbone of New Guinea. As far as I could judge, separate streams issue from those ranges, giving origin to many small rivers, some of which disembogue in the small bay of Port Geelvink, and others in the larger Geelvink Bay. These mountains, even at the highest point attained by me, are clothed with magnificent arboreal vegetation, lofty and dense; but I was much astonished to find amongst the trees a species of oak and a conifer, which latter was afterwards recognised by Dr. Beccari as an *Araucaria*. Within a few minutes of the Equator, in 134° E. longitude, all the climates of the world, except the Arctic, are represented:—that is to say the tropical at the base, and the temperate on the upper slopes and summits, offering a rich variety of trees and plants; and the same description applies also to the neighbouring

mountains, where exist the most beautiful species of birds of paradise known to the world.

The climate here is rather humid; but it must, at the same time, be very healthy, because the people who inhabit those mountains are very strong and well built. In my opinion they may be considered the purest type of the race called the Papuan, which, I may here say, *en passant*, has no claims to be considered, ethnologically, as a distinct race. These mountaineers appear until within recent years to have kept entirely aloof from the world, living quietly in their mountains, and having no intercourse with strangers. They were considered cannibals until, in 1872, I was first enabled to ascertain for myself that a European could live among them without running any danger of being cooked and eaten. They live in tribes under a chief called Korano, and cultivate tobacco, yams, bananas, and sweet potatoes. Their houses are constructed of piles of wood, and several families live in one house, but each family has a portion allotted to itself. I observed, however, that the men lived on one side and the women on another. On the whole I found them a very good sort of people, and tolerably industrious. As far as I could judge, they appeared to have no religion, but were imbued with many superstitions, amongst which I think I detected a belief in the transmigration of souls. On the graves of their dead they generally place some tobacco and provisions, which they think the defunct will rise up and eat at night.

The missionaries of Andai endeavoured to dissuade me from attempting to venture alone among the savages of Arfak, but seeing me determined, they procured me the friendship of a Korano or chief, and an interpreter, and on the 4th of September I started for the mountains, escorted by the latter and eight or ten Papuans of Andai.

I shall not refer to the incidents of the journey beyond stating that I lived about a month in a Papuan house at a height of 3600 feet above the level of the sea, and in the course of my daily shooting expeditions I reached an altitude of 5000 feet. The undertaking was perilous and perhaps foolhardy on my part, the inhabitants being ferocious hunters after human heads, and of so jealous and capricious a temper that if I showed my friendship to some among them I ran the risk of incurring the hatred of others. I felt myself, however, fully repaid by the large number of rare and beautiful species which I obtained, and was able to offer for the admiration of naturalists. I had at my own risk found my way into the mountain ranges, and had discovered the true localities and birthplace of the handsomest species of birds of paradise. I had taught the natives the benefits they might obtain from intercourse with white people; and those who followed afterwards on the same track would thus derive great advantage from the example set by me. I can say with a feeling of pride that I have been the pioneer of the Arfak Mountains. Circumstances and the state of my health unfortunately compelled me to

leave unfinished the work which had been so successfully commenced, and I left this part of New Guinea on board a man-of-war, which the Italian Government generously sent to our assistance. On board this ship (*Vittor Pisani*) I visited the islands of Ki and Arru, after which we proceeded to Australia, stopping once only at Orangerie Bay, in the south-eastern peninsula of New Guinea, in $149^{\circ} 50'$ E. long., and $10^{\circ} 30'$ S. lat., after a futile attempt to reach Outenata. The discovery of a new species of bird of paradise, the beautiful *Paradisea Raggiana*, and the sight of the mountain heights close to the sea, inspired me with the desire of exploring those southern parts about which little was known, as soon as the state of my health would allow me to do so.

In the month of March, 1875, I returned to New Guinea, and settled for a time in Yule Island on the southern coast near Port Moresby. Nothing was previously known of the interior of this island, and the natives had never had any intercourse with white people; the only European they had ever seen being the crew of H.M.S. *Basilisk*, with whom, however, they had had no dealings. I landed on the 16th of March, and commenced my residence by explaining to some natives whom I saw on the beach the objects I had in view in coming amongst them. I tried to convey my meaning by signs, not knowing a single word of their language. Three days afterwards I settled down, and the small ship which had brought me thither sailed away, leaving me alone to my fate. I was induced to choose Yule Island on account of the apparent salubrity of the place, its vicinity to *terra firma*, for so I will call New Guinea, and the high chain of mountains which extends from Mount Yule south-eastwards to the lofty Mount Owen Stanley. My object was to study the inhabitants, who belong to a different race from those who inhabit the north; to make collections of objects of Natural History, study the products of the country, and ascertain what advantages it offered to colonisation and European commerce. It will of course not be thought strange that, in a country wholly new and unknown, I had to encounter serious difficulties; but in eight months of residence there, I succeeded in vanquishing many of them, and was able to obtain a rich zoological collection, and make interesting notes on the character of the country and its inhabitants.

My relations with the natives were, I may say, of the most satisfactory description, notwithstanding that a dark cloud enveloped us for a time. But I was never obliged to resort to extreme measures, and everything was settled pacifically. The climate of the island, though certainly better than in other parts of New Guinea, had its effect upon me, and for this and other reasons I decided to abandon the island in November—at least for a time. On arriving at Somerset, North Australia, I found the Rev. Mr. Macfarlane, of the London Missionary Society, preparing an expedition to the Fly River, and having been invited by him to join it,

although suffering at the time from an attack of dropsy in the legs, I readily accepted his invitation.

We started in the *Ellangowan*, the steamer belonging to the Missionary party, at the end of November.* Notwithstanding the hostility displayed by the natives, who for two days made constant attacks upon us in numerous canoes at the mouth of the river, whom, however, we managed to get rid of by the aid of our guns, but without any bloodshed, we succeeded in ascending the river about 150 miles; but just at the most interesting part we were obliged to turn back. I then resolved to abandon the idea of going to Java, and to proceed instead to Sydney, where I knew great interest was felt in discoveries in New Guinea, of which I thought I might take advantage, in order to prepare another expedition.

I found the very liberal Government of that colony fully disposed to grant me the use of a small steamer, and a few private citizens ready to contribute towards the necessary expenses of the expedition which I proposed to make to the sources of the Fly River.

With these means now at my disposal, I managed in 1876 to ascend the river to a distance of 500 miles, or rather more, and I may say that I reached its sources. My vessel could not be navigated any further, although she only drew $3\frac{1}{2}$ to 4 feet of water: I had reached, however, the mountainous country, the counterscarp of the high central chain called Charles Louis, from which the Fly takes its rise. It was my original intention to abandon the *Neva* at the end of the navigation on the river, and to attempt to cross by land to Hall Sound; that is to say, to return to Yule Island, where I could have met with assistance from the missionaries, who had established a station there on my departure; but the course of the river had carried me further west than I supposed, and as my men, nine in number, had suffered considerably from fever and privations which had exhausted their strength, and as we should have incurred the risk of perishing of hunger, it would have been folly to attempt it. We were compelled, therefore, to retrace our course down the river, and after passing about three months, making collections in the Katau, I returned to Sydney with the intention of organising a new expedition and trying my luck once more. During our voyage down the river, we were twice attacked by natives, but we succeeded in avoiding bloodshed. The sight of the *Neva* and the noise of our guns sufficed to disperse them, but, in preparing for a new voyage, I could not possibly foretell what might happen. I obtained the loan of the *Neva* once more from the Government at Sydney, but this time the fitting out of the expedition was entirely at my own expense, and on the 3rd of May, 1877, I started for the third time towards the River Fly.

On this occasion the crew again consisted of ten persons, including

* For an account of this journey, see 'Proceedings R. G. S.,' vol. xx, p. 253.

myself: namely, three South Sea Islanders, five Chinamen, and one white, who was the engineer. It was impossible to take a larger number, as the *Neva* was a steam-launch of small tonnage and an open boat. I loaded her with as much provisions as I possibly could, in order to be independent of the natives. At the mouth of the Fly the natives either abstained from putting in an appearance or came as friends, thus showing that the lesson received from the *Ellangowan* had borne its fruits. But on reaching higher up the river, where we had never before seen any natives, and even believed the country to be totally uninhabited, we were attacked at night by a number of the savages, some in canoes and others from the shore, at a very short distance from where we had anchored. It was a fortunate circumstance that I awoke just at the moment when one of them was on the point of boarding our vessel, otherwise we should have been all killed. As the night was intensely dark, and we were firm at anchor with all our crew asleep, the only course open to me was to seize a gun and fire on the bold intruder. In the meantime my men awoke; but, for fear of their being wounded, I ordered them to keep themselves concealed, I alone defending the lives of my party. Although we could not see the arrows, we could hear them showering down upon the little vessel like hail. In self-defence I could do no otherwise than reply to the arrows by a fusillade, and I did so. Where is the man who would have acted differently, unless he wished to die a martyr? The natives continued the fight for twenty minutes, and I responded with my gun, discharging altogether 120 shots. This incident occurred on the 1st of June.

We continued our journey up the river, stopping here and there a few days for the purpose of collecting, and exploring the surrounding country. The few natives met with ran away without molesting us. The banks of the river seemed to be uninhabited, and rarely were there to be found in the forest any old pathways indicating a permanent population. We thus passed two months quietly. When I say quietly, I mean as far as the natives are concerned, but it was not a quiet time to me. My crew, owing to the somewhat monotonous life, became insubordinate, and one day refused to work at all, adopting all the devices they could think of to induce me to abandon my enterprise. The drought had caused a great subsidence in the waters of the river, and in August we found our way up-stream barred by a bank of pebbles. I waited for the rains, in order to be able to continue my journey, and at last succeeded in crossing the bar and pushing my way into the mountainous country again. Soon after I found it impossible to proceed any further. The last point reached on this third voyage was 475 miles from the mouth, being 45 to 50 miles less than we accomplished in the voyage of the preceding year. We arrived at that point on the 24th of September, and I hoped that after the rains the river would rise and enable me to reach the spot which I had touched on the voyage of the previous year, but my hopes were

frustrated by an untoward incident. Our Chinamen left to sleep on board deserted in the night, taking with them our small boat. All other objects had now to be set aside to recover the runaways. We turned our prow down river in chase, but, losing a day at a bank of shingle which barred our progress, we failed to overtake them.

Although reduced to five in number, I could not think of abandoning my enterprise. The South Sea Islanders, who had up to this time covertly tried to place every obstacle in my way to compel me to commence my return journey, but had never shown themselves openly rebellious, now, however, suddenly attempted it, and I may say that for three days they were the complete masters of the *Nera*. They assumed full command, and gave orders to the engineer, who, however, had the good sense not to obey them. After three days passed in this manner, firm at anchor and with worse perils before them, not knowing themselves what to do, they at last came to ask my pardon; and, to test their sincerity, I gave orders that the vessel should proceed up the river again, to the spot whence the Chinese deserted, there to remain until such time as I had pre-arranged for the commencement of my return journey.

Having arrived in the low plains through which the river flows for a long distance, where there is but little forest, and the banks and surrounding country are clothed with herbage, I was much astonished to find a great tract of land charred by recent fires. We soon met with many natives and recently constructed villages. They were all new people to us, probably mountaineers who had come down from the high ranges in pursuit of game, which, owing to the drought, had resorted to the banks of the river. Thus we found once more our progress barred. Of the two modes of clearing the way—force and diplomacy—I tried at first the latter, but without success. The natives would not heed our signs of peace, and assumed a most threatening appearance. We were only five on board besides myself, including the engineer and steersman; leaving but three men to resist the attacks of hundreds. We tried to escape them, but they gave chase in about twenty canoes of eight or ten men each.

I refused permission to my men, notwithstanding their urgent request, to use their guns; but the peril of our situation soon became intensified by the report of the engineer that he had no more fuel, and must stop the engines. Further parties of hostile natives appeared on the bank at a turning of the river, and, on our passing, jumped into their canoes and joined in the chase. With great reluctance I was now compelled again to use force, but three shots from my rifle sufficed, and we were saved. This was the last of our battles, but, unfortunately, not the last of our dangers, others were in store for us. On the 8th of November, when anchored off the island of Attack, two hundred natives passed us in numerous canoes, apparently unarmed, within 500 yards. We had decided to stay the night there, but, on perceiving these folks, we deter-

mined to anchor off the island of Kiwai. We started after dinner, I being at the helm, and our native boy attending to the soundings, the other two men being laid up with fever.

During our passage a heavy storm burst over us, accompanied with thunder and lightning and a violent gale. The evening was drawing nigh, it rained in torrents, and the tide was running down. Owing to the heavy rain we lost sight of the land, and could not distinguish the compass. Although our engine was only at half-speed, the current carried us with great rapidity. We believed ourselves safe, as we were in 4 fathoms of water, when suddenly the boy called out, "3 fathoms, 2 fathoms!" and before he could say more the *Neva* was driven on a sand-bank. To employ our strength in trying to liberate her would have been useless.

After the storm had passed, we perceived that we had been driven towards the village of Para, in the island of Kiwai. The natives did not fail to see us soon afterwards, and to fully comprehend our position, because ere long they commenced to sound their horns, beat their drums, and dance their war-dance amidst a great display of torches. We passed the night in momentary expectation of being attacked. In the distance could be seen the reflection of more fires and burning torches, and we could hear the response of distant drums. On the following morning the *Neva* was 30 yards distant from the water, high and dry on a sand-bank, which extended about 400 or 500 yards towards the village of Para. Although there were about a thousand natives on the shore, we were fortunately not attacked. The waters soon began to rise, and with the high tide we escaped from our perilous position. At last we found ourselves again at the mouth of the Fly, and I hoped that all my troubles were at an end. Owing to stress of weather, which prevented us from setting out to sea, we were obliged to pass a few days in a canal of the island of Mibu. Further desertions reduced our number to three—namely, the engineer, the youngest of the South Sea Islanders, and myself, all in a weak state of health, especially the engineer. I was obliged to act as captain, engineer, steersman, doctor, and cook; and, being the best in health of the three, I was able to nurse the sick in turns. At last, however, I was also obliged to lay up, and then we could only trust to Providence. We succeeded in crossing Torres Straits, and reached in safety Thursday Island, near Cape York, to which the Somerset settlement had been removed.

The results of my voyage to Yule Island were of the utmost importance in a Natural History point of view, and they would have proved still more important if I had not lost the major portion of my collection by shipwreck.

The knowledge I acquired of the country during my sojourn gives me good ground for believing that, whenever New Guinea becomes a

field for colonisation, a great future will be in store for Yule Island. The island itself may become the seat of a large population, to which all the products of New Guinea would flow. The bay offers facilities for a very safe port. The huge plains of the neighbouring mainland, well irrigated and rich in pasture-land, could certainly be utilised by the agriculturist. The vicinity of the mountains, which are clothed with rich forests, would also be a source of wealth; and if valuable minerals be added to the products of the soil, there can be no doubt as to the brilliant future in store for that part of New Guinea. The intelligence and good qualities of the natives also ought to form one of the elements in the development of that country, and I think ought to be made use of.

As regards the River Fly, perhaps the largest in New Guinea, I cannot hold out hopes of its future utility. As a means of entrance to the interior it is of great importance, owing to its enormous width, length, and depth; and I may say it is the only available one in the present state of our knowledge; but the nature of the land through which it flows does not inspire me with much confidence in its future. I am not speaking in reference to the hostile populations which inhabit it, but as to the character of the country itself—the interminable forests which for the best part of the year are under water, and the vast grassy plains which are most likely converted into lakes during the rainy season. There is no doubt that this vast plain must be intersected by many side channels; but I did not discover any large affluent except the River Alice far in the interior. Strictly speaking, however, I do not know if the Alice can be called an affluent, because it does not appear to mingle its waters, at all seasons, with the Fly; but rather to cross it, leaving it again on the opposite bank. But it forms a river of much importance, which must possess a number of small tributaries. I cannot, however, exclude the probability that the Alice after flowing eastwards may eventually re-enter the Fly, because during my third voyage I discovered a large confluent, about 40 miles from Ellangowan Island, which may be the Alice. Above this confluent the bed of the river narrows very considerably.

That there are other large streams yet to be discovered flowing into the delta of the Fly I do not doubt, because the large mass of fresh water which extends from Waighi to Dibiri—the two tracts of the New Guinea mainland which enclose the delta, the latter forming a true archipelago, comprising the islands of Mibu, Kiwai, Attack, and many other smaller ones north-west of Kiwai—cannot possibly be derived from the Fly alone.

Having spent the whole of one dry season at a short distance from the sources of the Fly, and having during that season seen the Alice reduced to the proportions of a shallow creek, and having noted the small amount of water in the Fly, I have come to the conclusion that its

supply is not sufficient to account for the large volume of fresh water at its mouth, in every season, which fills deep channels of the united width, according to my estimate, of 15 to 20 miles. This raises the belief in my mind that other large tributaries are to be found which disembogue at the north of the group of islands formed by Long Island, Attack, and others of smaller dimensions. But it is also not improbable that there may be some large river, yet to be discovered higher up, flowing into the channel formed by the islands of the Fairfax group.

The mountains and plains of New Guinea are clothed with luxuriant tropical forest, to clear which would be a task of great labour. From the sea-shore to the foot of the main range, known at its western extremity as the Charles Louis chain, extends a vast plain, broken here and there by ridges and chains of lower hills.

That the land is fertile I have no doubt, but whether white men can live and prosper there is a problem which might cost dear to solve. The low lands at the mouth of the river are certainly not suitable to the white man, and I do not believe that he could acclimatise himself there. The mountainous country, which is situated between latitude 5° and 6°, might perhaps offer better prospects, but successful colonisation there would be difficult. There may be natural resources to attract the enterprising trader, but the products are chiefly of the vegetable kingdom. There are many precious woods; the nutmeg grows plentifully, and might be utilised, and gums and resins would form articles of exportation; but I doubt if trade would be profitable. The development of the mineral resources alone can produce a change in the present state of the country, but I am certain that difficulties of every kind will for a long time frustrate any attempt in that direction. Land-travelling would be most difficult. Horses and other animals of burden would in many instances be worse than useless, owing to the nature of the soil and the want of forage. The islands at the mouth of the Fly River are very flat and covered with, if not formed of, a thick stratum of alluvial land, and are therefore very fertile. But I do not believe that a European could live there.

New Guinea does not possess any of those large animals which render Africa so interesting, and the products of which form so important an item in the commerce of that country. The accounts published by certain travellers of the existence of large animals in the interior of New Guinea are fables, and exist only in the imaginative brain of the narrators. Leaving on one side the importance which New Guinea may acquire from its mineral resources, which are, however, not yet ascertained, we must for the present be content to regard it as the country of the birds of paradise, and as such it will be sacred ground to the naturalist.

The fauna, which is partly already known, still contains great novelties in store for future explorers. As far as I am concerned, I shall

consider it a sufficient reward for all my toils if I am regarded as a pioneer who has shown the way to the summits of the Arfak, to Yule Island, and to the wilds of the interior by way of the Fly River; and in doing so has enriched the museums of Europe with the zoological treasures of the island.

On the conclusion of the Paper :

The CHAIRMAN remarked that there could be no doubt the island of New Guinea would at no distant date become a place of considerable interest, and probably of importance in a colonial and commercial sense. Gold had been found there, and a company of gold-diggers were already at work on the Goldie River, near Port Moresby; but gold was a very doubtful blessing, and he would rather hear of other metals being obtainable there. Admiral Moresby, three sessions ago, had given the Society an account of his discoveries in the south-eastern part of the island; * and in May, 1876, we had listened to an interesting paper by Mr. D'Alberty, on the Natives and Products of the Fly River.† In short, every year seemed to prepare the way for that more perfect knowledge which would certainly, sooner or later, lead to colonisation.

Dr. GEORGE BENNETT (of Sydney) said he had listened with great pleasure to the Paper which had just been read. He became acquainted with Signor D'Alberty first in 1873, at Sydney, and since then had taken much interest in all his explorations. On his return from the Fly River after his journey with Mr. Macfarlane, Signor D'Alberty desired to obtain a steam-launch, in which to explore the river himself. The inhabitants of Sydney were asked to subscribe towards the payment of the crew, and Signor D'Alberty offered himself to bear the expense of the outfit, provisions, &c. He (Dr. Bennett) took the matter up, and went himself to the Treasurer of the New South Wales Government (Mr. Stuart), and placed the case before him. Mr. Stuart replied, "There will be a meeting of Council to-day: write down what you require." That was done, and the meeting was held, and in two or three days an official letter was sent, stating that a steamer would be placed at the disposal of the gentlemen who had interested themselves in the proposed expedition. On inquiry, they found that the steamer would not be large and strong enough to stem the current of the Fly River, and he had therefore again to apply to the Colonial Secretary, with the result that the *Neva* was placed at their disposal. A meeting of the inhabitants of Sydney was then held, and a sum was subscribed sufficient for the expenses of the crew. Many persons advised Signor D'Alberty not to attempt so dangerous a voyage in so small a vessel, for the *Neva* was only an open boat of eight tons burden; but nothing was able to deter him from his adventurous undertaking. On his return to Sydney, he wished (as he had related) to try a third time, and an application being made to the Government to allow him the use of the steamer once more, the request was readily granted by Mr. Robertson, the then Premier. The perilous nature of the expedition could hardly be understood except by those who have had personal experience in those localities. To cross Torres Straits in an open and deeply-laden boat, liable at any moment, from the sudden changes of weather, to be swamped, was no small feat. He therefore thought Signor D'Alberty ought to be thanked for what he had done, in making us better acquainted with the geography and natural history of New Guinea.

* 'Proceedings,' vol. xix. p. 225.

† 'Proceedings,' vol. xx. p. 343. See also Mr. O. C. Stone's paper, same vol. p. 330, and Mr. Goldie's, on his Journey in the Interior from Port Moresby, vol. xxii. p. 219.

Sir RAWSON RAWSON had had the opportunity of learning much in conversation with Signor D'Albertis of the troubles and difficulties he had experienced. No doubt in his several voyages he had encountered many dangers, but it was only right that it should be known that though there were one or two hostile tribes, the natives were for the greater part mild, docile, and easily managed, and would probably make very good agriculturists. Signor D'Albertis was of opinion that there was an opening for any person or company that chose to send out two or three experienced agriculturists with the necessary instruments. They would find the inhabitants disposed to work, and capable of becoming civilised. As an instance of the cool courage which Signor D'Albertis had displayed in the midst of peril, he would mention that on one occasion some natives were disposed to attack him, but they had an idea that he was protected by his jacket, to which they were unaccustomed. They imagined there was some magic in it. To disabuse their minds, he took off the jacket, and said, "Take the jacket: now then attack me." Of course he held his revolver in his hand, behind his back, but the people shrank from him, abashed by his courage.

Dr. MULLENS said he had watched with interest Mr. D'Albertis' progress for several years, as he had been in correspondence with Mr. Macfarlane, Mr. Lawes, and others, who had constantly met him. It was therefore with peculiar interest that he now saw his face, and heard the account which had been given in the Paper. The London Missionary Society had no additional information of recent date concerning the part of New Guinea which included the great wide plain of the Fly River; but they knew that the natives in Torres Straits were increasing in knowledge and becoming better acquainted with Englishmen, so that it was much more safe to pass through than it was a few years ago. In his account of his second journey, Signor D'Albertis acknowledged, in a very handsome way, the kind help and comfort he received, after his perilous voyage down the Fly River, from some of the native teachers and schoolmasters in the islands of Tauan and Saibai. The information lately received referred rather to the eastern end of New Guinea, where two missionaries had been prosecuting very important journeys. He hoped during the present Session to have an opportunity of laying the facts so ascertained before the Fellows of the Society. The new map of the south face of the island, in the neighbourhood of Orangerie Bay, was at present in the possession of the Admiralty, and he hoped the Society would be able to see it before long.

The CHAIRMAN, in proposing a vote of thanks to Signor D'Albertis for his paper, complimented him on the courage and tenacity of purpose with which he had pursued his explorations.

The Arctic Expeditions of 1878. By C. R. MARKHAM, C.B.,
Secretary R.G.S.

Map, p. 80.

1. THE SWEDISH ARCTIC EXPEDITION.

(Read at the Evening Meeting, December 9th, 1878.)

THE Swedish Arctic Expedition, which sailed from Gottenburg on the 4th of last July, has achieved a great geographical success. It has done what has been attempted in vain during the last three centuries. It has successfully rounded the northern extremity of Asia, the *Promontorium Tabin* of Pliny* and the ancient geographers. Achieve-

* "Iterum deinde Scythæ. Iterumque deserta cum belluis, usque ad jugum incubans mari, quod vocant Tabin." (C. Plinii Nat. Hist., lib. vi.)

ments such as this form landmarks in the history of discovery, and points of departure for future work. They close the long and glorious record of centuries of effort; while they are starting-points inciting to further attempts, and to the acquisition of still more valuable results.

The great merit of this memorable exploit lies in the fact that it was no mere piece of good fortune, no lucky chance. The whole plan was long and carefully thought out. The necessary experience and knowledge were obtained by more than one tentative voyage. The history of previous voyages and land journeys was carefully studied, and much research was bestowed upon the collection of information from all known sources. The special results, in various branches of science, to be derived from an expedition by the contemplated route, were very exhaustively considered; and nothing was omitted that forethought could suggest to ensure success.

The Swedish explorers had had long previous training in the Spitzbergen direction. The Swedes, between 1858 and 1872, sent no less than seven expeditions to Spitzbergen and two to Greenland; and all were successful because all returned with valuable scientific results. Mr. Oscar Dickson, the munificent supporter of these expeditions, truly remarked to me at Gottenburg last summer, that a satisfactory measure of success was always certain, whether the actual programme of the voyage was carried out or not, because the main and true object was scientific investigation. In this spirit the work was done in Spitzbergen; and it was not until Professor Nordenskiöld was fully convinced that no useful end could be attained by attempts to push northwards on the Spitzbergen meridians, that he turned his attention to another route. He then resolved to attempt the North-East Passage.

The hardy Norwegian fishermen had already opened the way through the Kara Sea, which had been sealed to the gallant Dutch and English adventurers of the sixteenth century, to Burrough, Pet, and Jackman; to Brunel, Barents, and Linschoten. The great secret was the right season in which to attempt the passage. This secret the Norwegians found out. Carlsen, in 1869, sailed across the Kara Sea to the mouth of the Obi, returning by the Matoshkin Strait, and in 1870, Captain Johannesen circumnavigated the islands of Novaya Zemlya. Since then the Kara Sea has been annually frequented by the Norwegian fishermen. It is, however, just to give Captain Wiggins, of Sunderland, the credit of having been the pioneer of a sea-route for trade between Europe and the Yenisei River which, in future years, will be important. His voyages in 1874, 1875, 1876, and this year, from that point of view, have been very useful, and his suggestion that an accurate survey of the Sea of Kara and of the Gulf of Obi should be undertaken, is well worthy of support by this Society.

Professor Nordenskiöld had most of these facts before him when he turned his attention to the north-east. He was a veteran explorer.

having served in six Arctic Expeditions, made two important spring sledging journeys, and experienced an Arctic winter on the 80th parallel. His knowledge of the literature of the subject is profound, and his scientific acquirements have secured for him a reputation of the highest order. Above all, he was determined to succeed, and with this object he patiently and perseveringly prepared, by two tentative voyages of reconnaissance, for the main expedition.

On the 8th of June, 1875, Professor Nordenskiöld sailed from Tromsø in the *Proven*, with Dr. Kjellman, an accomplished botanist, and Dr. Stuxberg, a zoologist, who are also his companions in the present expedition. The result of this voyage was very important. The Swedish explorers established the fact that the Yenisei River can always be reached by navigating the Sea of Kara at a certain period of the summer, and they discovered a good anchorage on the eastern side of the mouth of the Yenisei, which was named Port Dickson, in honour of Mr. Oscar Dickson of Gottenburg, the enlightened supporter of the voyage. Nordenskiöld returned overland, and it having been suggested that his success was due to the unusual state of the ice in the season of 1875, he resolved to refute this theory by undertaking another voyage to the Yenisei, in 1876, which, if successful, would prove that the navigation is practicable every year. He sailed from Gottenburg in a steamer of 400 tons, called the *Ymer*, again accompanied by Drs. Kjellman and Stuxberg, and entered the Sea of Kara on the 31st of July, 1876. At that time the sea was much encumbered by ice, but it cleared away during August, and the *Ymer* crossed the Gulf of Obi and entered the mouth of the Yenisei. He returned through the Matoshkin Shar in September, and found the sea to be perfectly free of ice.

Having satisfied himself, in this thoroughly workmanlike and practical fashion, that Port Dickson could be reached every year during the last half of August, Professor Nordenskiöld proceeded to study the history of all attempts to navigate the northern coast of Asia between the Yenisei and Behring Strait, in order to estimate the difficulties, and decide upon the best way of overcoming them.

He first turned to the coast from the mouths of the Obi and Yenisei to the most northern point of Asia to the eastward. Here a few attempts had been made by the Russians, nearly a century and a half ago, and had failed. In 1738 and 1750 vessels were sent from the Yenisei along the coast, and one reached a latitude of $75^{\circ} 15' N.$, but she returned on the 2nd of September, not, as would appear, because she was stopped by the ice, but on account of the lateness of the season. No further attempt was ever made, and the northern extremity of Asia was discovered by the land sledge journey of Lieutenant Chelyuskin in 1742. The cape very properly received his name, and the peninsula from which it juts into the Polar Sea is known as Taimyr. The cape is also called Severo. It is the *Promontorium Tabin* of Pliny. Middendorf, as is well

known, reached the coast of Taimyr on the 25th of August, 1843, and found the sea free of ice as far as the eye could reach. There was nothing in all this to make Nordenskiöld despond. On the contrary, the very little that was known induced him to believe that Cape Chelyuskin might be rounded by a steamer. He trusted to the great volume of the Siberian rivers as a force which keeps the ice off the northern coast of Asia when the currents are most powerful, late in the summer.

He next turned to what had been done on the eastern side of Cape Chelyuskin. In this direction the Russians of the last century made several very gallant attempts, starting from Yakutsk, 900 miles up the River Lena, where their vessels were built. The most successful, as well as the most fatal, was conducted by Lieutenant Prontschicheff in 1735, who wintered at the mouth of the River Olonek. In the next year he made progress towards Cape Chelyuskin as far as $77^{\circ} 29' N.$, whence he was compelled to return by compact masses of ice in the middle of September, 1736, and both he and his young wife, who accompanied him, died of scurvy during the ensuing winter. A second expedition left the Lena, under the command of Lieutenant Laptief, in 1739, and got within 60 miles of Cape Chelyuskin, wintering in the Chatanga; but with this ended the voyages to the westward from the mouth of the Lena. No one had succeeded in rounding the northern extreme of Asia.

From the mouth of the Lena to Behring Strait there are much more numerous observations. The Cossack Deshnef left the mouth of the Kolyma in a fleet of seven small vessels, on the 1st of July, 1648, and actually succeeded in passing through Behring Strait before that navigator was born, and in reaching Anadyr in October. Several voyages were also made northwards by Michael Staduschin in consequence of the reports of natives respecting islands where there was fossil ivory, and this was finally verified by the discovery of the New Siberia Islands. Between the Lena and the Kolyma, Lieutenant Laptief made a successful voyage in 1739 and 1740, wintering, however, midway at the mouth of the Indigirka. Hedenstrom, who surveyed the New Siberia Islands in 1809 to 1811, Anjou, who continued the same operation in 1823, and Baron Wrangel from Nijni Kolymsk, all did their work by sledging over the ice, and not by navigating the sea.

From the side of Behring Strait, Behring himself only got as far as $172^{\circ} W.$ along the north coast of Asia; Captain Cook reached the 180th degree of longitude on August 19th, 1778; Captain Rodgers got to $176^{\circ} E.$ in open water in 1855; and in 1867 Captain Long attained the meridian of $170^{\circ} E.$ The latter sighted the mysterious Wrangel Land, which was also reported by Sir Henry Kellett.

On reviewing this record of voyages along the Siberian coast as a whole, Professor Nordenskiöld came to the conclusion that the failures were not due to obstruction by ice so much as to the unseaworthiness of

the vessels. The sloops built in the Siberian rivers had their planks secured together by bark twine, and were caulked with moss. The danger to them was from heavy seas far more than from ice-floes; and the wretched means at their disposal enhance the admiration which is due to the Russian explorers for their gallantry and devotion to duty. Their experiences appeared to give sound reason for the hope that a well-found steamer would succeed where they had failed.

The next consideration was the results of an expedition by this route. For success in Arctic enterprises, in the view of reasonable geographers, does not consist so much in North Poles or North-East Passages as in the value of the geographical and other scientific results to be obtained.

By the route of Cape Chelyuskin and the North-East Passage, these appeared to Professor Nordenskiöld to be of great value. In the first place, a hitherto almost unknown sea of enormous extent would be surveyed. Every mile beyond the mouth of the Yenisei is a step forward to a complete knowledge of our globe. We have at present no knowledge of the vegetable and animal life in the sea which washes the north coast of Siberia. In the Siberian Polar Sea, too, the animal and vegetable types probably consist of survivals from the glacial period, which is not the case in the Polar Sea, where the Gulf Stream distributes its waters, and whither it carries types from more southerly regions. But a complete and certain knowledge of what animal types are of glacial and what of Atlantic origin is of the greatest importance, not only for zoology and the geography of animals, but also for geological science. Then, again, there is still much that is enigmatical with respect to a number of circumstances connected with the mammoth period of Siberia, which perhaps was contemporaneous with our glacial period. Our knowledge of the animal and vegetable types which lived at the same time as the mammoth is exceedingly incomplete, although we know that there are small hills covered with the bones of the mammoth and other contemporaneous animals, and that there is found everywhere in that region so-called "Noah's wood"—half-petrified or carbonised vegetable remains from several different geological periods. An investigation of the geology of polar countries is indeed an indispensable condition for a knowledge of the former history of our globe. Then, again, important practical results will be derived from meteorological investigations; for the Polar Sea north of Siberia is a meteorological territory, at the same time of the greatest interest and yet entirely unknown. In addition to these special points, there are geographical discoveries, observations in terrestrial magnetism, and other branches of physics, natural history, ethnological, and hydrographic researches.

Having, by these patient and exhaustive inquiries, fully convinced himself that the enterprise was feasible, and that its results would be of great value, Professor Nordenskiöld unfolded his plans to his countrymen, and at once met with an appreciative and generous response. Out of the 20,000*l.* that the Swedish Expedition has cost,

I believe that Mr. Oscar Dickson of Gottenburg, to whom Arctic research already owed so much, provided 12,000*l.*; while the king of Sweden, the Swedish Government, and Mr. Alexander Sibiriakof, a wealthy Siberian proprietor, made up the rest. Mr. Dickson bought the *Vega*, a steam-whaler built at Bremen of teak, and well adapted for the service; she was fitted out at Carlserona, and proceeded to Gottenburg, whence she took her final departure on the 4th of July, 1878. The officers and scientific staff are as follows:—

1. Professor Nordenskiöld, Leader of the Expedition.
2. Lieutenant Palander, Commander of the *Vega*, who served with Nordenskiöld in the Spitzbergen Expedition of 1872–73.
3. Dr. F. Kjellman, of Upsala, *Botanist*, } with Nordenskiöld in his two former voyages
4. Dr. A. Stuxberg, *Zoologist*, } to the Yenisei.
5. Dr. E. Almqvist.
6. Lieutenant Andreas Hovgaard, of the Danish Navy.
7. Lieutenant E. Brusewitz, of the Swedish Navy.
8. Lieutenant Giacomo Bove, of the Italian Navy.
9. Lieutenant Nordqvist, a Finnish officer and geologist.

The crew consists of eighteen seamen selected from two hundred eager volunteers, and of three hunters.

Professor Nordenskiöld was in England shortly before he sailed, and we had the honour and pleasure, at our meeting on February 25th, 1878, of wishing him a hearty God-speed.

The *Vega* was accompanied as far as the Lena River by a small steamer called the *Lena*, of 100 tons, commanded by Captain Johannesen. She belongs to M. Sibiriakof, and is destined for use on the Lena River, where his property is situated; while during the voyage she was to be useful as a tender to the *Vega*. Another steamer also went out with a cargo as far as the Yenesei, called the *Fraser*, commanded by Captain Nilssen, and she was to tow the *Express*, a sailing vessel also laden with goods. This is a mercantile adventure of M. Sibiriakof, and its success will doubtless lead to a regular trade with the Yenisei. The *Vega* was to fill up with coal at Port Dickson from the *Fraser*.

The expedition was provisioned and equipped by the light of the best modern experience, and was supplied with every appliance to secure the health of officers and men, with scientific instruments of all kinds, deep-sea sounding apparatus, and equipments for sledge travelling.

The first news from the *Vega* was contained in Professor Nordenskiöld's letter dated at Port Dickson on August 7th, 1878.

The *Vega* sighted Novaya Zemlya on the 28th of July, and anchored off a Samoyed village called Chabarova in Pet Strait* (improperly called

* Arthur Pet, in a vessel of 40 tons, sailed in 1580, and discovered the strait between the mainland and the Vaigat, which ought, therefore, to be called Pet Strait, and not Jugor Strait.

In like manner the strait between Vaigats and Novaya Zemlya was discovered by Stephen Burrough in 1556, and ought to be called Burrough Strait. It is improperly called Kara Strait.

Jugor Strait) at the entrance of the Kara Sea. The *Fraser* and *Express* had been at anchor here since the 20th, and had seen no ice. On the 31st the *Lena* also arrived. Dr. Stuxberg immediately proceeded to dredge in the strait, making a rich collection, while Dr. Kjellman explored the *flora* of the surrounding country. Lieutenant Hovgaard took a series of magnetic observations, and, indeed, all the officers were busily engaged in their several departments during the short stay in the Samoyed country. Especially Professor Nordenskiöld made a valuable ethnological collection, and Dr. Almqvist experimented, by Holmgren's method, on the sense of colour of the Samoyeds.

On the 1st of August the little squadron weighed anchor, and steamed into the Kara Sea, which was perfectly free of ice. The *Vega* dredged and sounded four times daily, the work being conducted by Lieutenant Palander, assisted by Lieutenants Bove and Brusewitz, and, in order to make up for time thus lost, Dr. Almqvist, Lieutenant Hovgaard and Lieutenant Nordqvist were sent on in the *Lena* to land in the strait separating the Yalmal Peninsula and Bieloï Island, make researches in natural history, and join the rest of the squadron at Port Dickson. No ice was seen by the *Vega* until she came to Bieloï Island, and then the floes were so thin and rotten as not to cause any impediment, much greater inconvenience being experienced from the thick fog.

To the east of Bieloï Island the ice disappeared again; and on the 6th of August the *Vega*, *Fraser*, and *Express* were all safely at anchor in the spacious harbour which had been named Dickson's Haven in 1875. Professor Nordenskiöld anticipates that it is destined in future years to be one of the chief ports for the export of the products of Siberia.

Three bears were killed on the first day, reindeer were seen grazing on the surrounding grass plains, and the vegetation appeared to be very rich.

The *Lena* arrived in the evening; and the next day the *Fraser* and *Express* departed for their destinations up the Yenisei River. Lieutenant Bove was meanwhile busily engaged upon a map of the harbour, and the naturalists were actively collecting, and exploring the surrounding country. The *Express* has since returned to London with a cargo of wheat and rye; and the screw steamers *Neptune*, of Hamburg, and *Werkworth*, of London (Captain Wiggins), have also made successful trading voyages to the Obi this year.

On the morning of the 10th of August the *Vega*, with her little consort the *Lena*, resumed her adventurous voyage, shaping a course for the most westerly of the Kamenni Islands, at the mouth of the River Pyasina. There was no ice during the first day, but the thick mist obliged them to lay-to for some hours off low islands of gneiss rock, covered with a luxurious growth of lichens. On the 11th ice was met with, but not in such quantity as to impede progress. It consisted entirely of bay ice so rotten as more to resemble slush than ice, and was

rapidly melting. The course lay through many unknown islands, and the vessel was most ably handled by Lieutenant Palander, and the two other watch-keepers, Lieutenants Brusewitz and Hovgaard. Organic life at the sea-bottom was found to be very rich, and valuable dredgings were made, which added to the collections of Drs. Stuxberg and Kjellman; but there were few birds.

Professor Nordenskiöld and Lieutenant Nordqvist, in examining the ice of a small floe, discovered some yellow specks which proved to be coarse-grained sand consisting of very beautifully formed crystals. As a practical mineralogist, the Professor formed the opinion that this was not an ordinary terrestrial mineral, but possibly a matter crystallised from the sea-water during the severe cold of winter.

From the 14th to the 18th of August they were at anchor, waiting for clear weather, in a splendid harbour situated in the strait between Taimyr Island and the mainland; which Professor Nordenskiöld named "Actinia Haven" on account of the number of *actinia* which the dredge brought up from the bottom. The country was plentifully covered with mosses and lichens, and offered far better pasturage than the valleys of Spitzbergen, where reindeer are plentiful. Yet here the reindeer were scarce and very shy. Captain Johannesen of the *Lena* attributed this to the presence of wolves.

Although the prevailing mist had not yet cleared away, the *Vega* and *Lena* weighed anchor on the 18th, and on the 19th continued steaming and sailing along the coast of the Chelyuskin Peninsula, passing a field of ice occupying a bay and attached to the land, but it was very rotten.

They sighted an ice-free promontory to the north-east, and ran into a little bay open towards the north, where they anchored at 6 P.M. of the 19th of August. Flags were hoisted, and a salute was fired from a little gun on board the *Vega*, for they had attained the first object of their voyage, the most northern point of the Old World.

The mist had cleared away, and the cape lay before them in the sunshine, free from snow. The Expedition remained until noon of the 20th, in order to fix the position of the cape astronomically, and to give the naturalists an opportunity of making excursions inland. Cape Severo is formed by a low promontory divided into two parts by the bay in which the two vessels had anchored. Higher land, with gently sloping sides, stretches from the western shore, parallel with the coast, in a southerly direction. The most western of the two promontories was found to be in

77° 36' 37" N.
103° 25' 0" E.

and the most eastern one in

77° 41' 0" N.
104° 1' 0" E.

Inland, the mountains appeared to rise gradually to a height of 1000 feet, and were nearly free from snow.

The plains are formed of clay-fields, some of which are nearly bare, and split up into more or less regular six-sided figures, while others were clothed with vegetation consisting of grass, moss, or lichens. The rocks were formed of upright strata of slate full of crystals of pyrites, but devoid of fossils. On the outer promontory the slate strata were crossed by great veins of quartz. Animal and vegetable life was meagre. Dr. Kjellman could only find twenty-four species of phanerogamous plants on the plains. Of birds there were sandpipers, some species of *Tringa*, a large flock of barnacle geese, a few eider ducks, and traces of owls. In the sea they saw a single walrus, a few seals, and two shoals of white whales. But the dredge brought up large *algæ*, and a number of minute animals.

On leaving the extreme northern point of Asia, a course was steered east by south, in the hope of discovering a western continuation of the New Siberian group. But a dense fog gave much trouble, the drift ice became thicker, and in the night of the 21st it was found that no further progress could be made due east. A more southerly course was therefore made, and at midday on the 22nd they lay-to near an ice-floe, waiting for clearer weather. The ice was quite rotten, but they were not clear of it until the evening of the 23rd. Hitherto the depth of water had been from 33 to 35 fathoms, but now it began to diminish, and they sighted the land forming the north-eastern extreme of the Taimyr Peninsula, which is in $76^{\circ} 30' N.$ and $113^{\circ} E.$ Six miles from the land the depth varied from 6 to 12 fathoms.

The mist had cleared away, and a north-westerly breeze carried the vessel swiftly, without the aid of steam, over a perfectly smooth sea. Soon the high country beyond the coast appeared, presenting that peculiar split-cone formation which also characterises the eastern shore of the Yenisei. Mountains, of at least 2000 to 3000 feet in height, were observed a short distance inland, all free from snow. The animal life now became very rich. Dr. Stuxberg's dredge brought up splendid hauls, masses of star-fish and of the extremely rare *Molpadia borealis*, and two cuttle-fish. All the animals were evidently indigenous to the Arctic Seas, without any invasion whatsoever from southern waters, as is undoubtedly the case off Spitzbergen. The collections will, therefore, be of value in regard to the researches as to the living and fossil (glacial) forms on European coasts, and to questions of great importance to the knowledge of the last era of the world's history.

As they had formerly encountered land where sea was indicated on the maps, so now they were sailing over an area shown on the maps as land.

At 11 A.M. on August 24th they sighted Probraschenski Island, at the mouth of the River Chatanga, which is four degrees to the eastward

of the position shown on the maps. Here they anchored for a few hours, and found a cliff, 300 feet high, at the north-east end of the island, to be the dwelling-place of innumerable looms and kittiwakes. Two bears were also shot; and the southern grass-covered termination of the island was clothed with a very luxuriant Arctic vegetation. The island was of chalk formation, but only one fossil (a belemnite) was found.

At 10 P.M. they again weighed anchor. They were in 73° to 74° N., and the nights were beginning to be dark, necessitating great care in the navigation, on the part of Lieutenant Palander, especially as the coast-line, as shown on the maps, is not to be relied upon; and the sea is very shallow—only 5 to 8 fathoms. On the other hand, they had magnificent weather after the 23rd, and the sea was entirely free from ice. The cause of this absence of ice is the mass of warm water, which the great Siberian rivers discharge into the sea during the summer.

The temperature of the water at the surface was ascertained six times every twenty-four hours, and the temperature and saltness of the water at different depths three times daily. The observations prove that a warm and only slightly salt surface-current runs from the mouths of the Obi and Yenesei, along the coast in a north-easterly direction, and afterwards, under the influence of the rotation of the earth, bends more to the east. Other similar streams are produced by the Chatanga, the Olonek, Lena, Indigirka, and Kolyma rivers, which all discharge into the Arctic Sea, waters more or less warmed by the hot summer of Siberia, and render it, for a short period of the year, almost free from ice along the coast. It was a correct forecast of these natural facts which led Professor Nordenskiöld to draw up the plan of his expedition.

He originally intended to have anchored at the mouth of the Lena, but a favourable wind and a sea free of ice offered such a splendid opportunity to continue the voyage, that he did not feel justified in neglecting the chance. On the night of the 27th of August he therefore parted company with the *Lena*, and the *Vega* continued on her wonderfully successful enterprise, shaping her course for Fadeyef, one of the New Siberian Islands, where Nordenskiöld intended to remain for a few days. Thence his plan was to proceed direct to Behring Strait and Japan.

The *Lena* parted company, and went up the Lena River to Yakutsk; whence telegrams and despatches were sent to Sweden.

It will be seen that this glorious success is due quite as much to the careful study of the subject beforehand, and to continuous perseverance during several years—which could not be turned away from the settled purpose, as to the skill and watchfulness of the navigators—great though those qualities undoubtedly were. This Meeting will, I am confident, authorise our President to convey to Mr. Oscar Dickson, the munificent

patron of the Expedition, the cordial and heartfelt congratulations of the Royal Geographical Society, and to transmit the same congratulations to Professor Nordenskiöld, Lieutenant Palander, and the officers and crew of the *Vega*. Happen what may hereafter, they have been the first to round the *Promontorium Tabin* of Pliny, the most northern point of the Old World, and have thus achieved a great and memorable success.

2. THE DUTCH ARCTIC EXPEDITION.

THE return of the Dutch Arctic Expedition, after having fully complied with the instructions drawn up for its guidance, is a geographical event of some significance. The great work of polar exploration becomes more difficult as it progresses, because each expedition, to achieve success, must advance beyond any point previously reached in the same direction. Hence the preliminary work of reconnaissance, of collecting information respecting the approaches to the unknown region, becomes more and more important; and in furthering this object the Dutch officers have done most valuable service.

The leading geographers and men of letters in Holland have evinced a warm interest in Arctic research and exploration ever since Admiral Sherard Osborn commenced those efforts to secure the despatch of an English expedition, which were crowned with success just before his lamented death. In March, 1865, our Honorary Corresponding Member, Commodore Jansen, contributed a most interesting paper to our 'Proceedings,' on the voyages of the Dutch in the Arctic seas in former times, and on the lessons to be derived from their recorded experience. Attention was thus turned to the share taken by Holland in Arctic discovery, and in 1874 Mr. S. Muller Fz. published his exhaustive and valuable history of the Northern Company. When Sir Allen Young undertook his first voyage to Baffin's Bay in the *Pandora*, in 1875, a young Dutch naval officer accompanied him with the object of acquiring experience in ice navigation. This was Lieutenant Koolemans Beynen, whose appointment was suggested by Commodore Jansen, and cordially approved by the Dutch Government. On his return from this voyage, Lieutenant Beynen edited and wrote a learned introduction for the second edition of the three voyages of Barents to the north-east, which forms one of the series of the Hakluyt Society. In 1876, Lieutenant Beynen joined the *Pandora* for the second cruise, and, during Sir Allen Young's resolute and persevering attempt to penetrate up Smith Sound, he acquired further Arctic experience in an excellent school.

The return of the English Expedition gave a fresh spur to the interest already taken by the Dutch in northern exploration. The story of the work done by the travelling parties of the *Alert* and *Discovery*, and of the way in which they faced and overcame almost impossible difficulties, as well as the record of important scientific results of the

expedition, called forth the admiration, not only of all true Englishmen, but of the whole civilised world. More especially was the great English achievement appreciated by the numerous geographers in Holland who had made a study of the subject. They resolved that an effort should be made to induce their countrymen to enter upon the work of Arctic research, and to emulate the deeds of their ancestors in that glorious field. Commodore Jansen took a leading part in this movement, and he was ably seconded by Jonkheer J. K. J. de Jonge (author of the 'Rise of Dutch Power in the East Indies') and other members of the Dutch Geographical Society, and by several leading members of the press. Lieutenant Beynen gave lectures in several towns of Holland, and local sub-committees were formed to collect subscriptions. The students of Leyden subscribed largely, and enthusiastically supported the project, and it was soon apparent that the heart of the Dutch nation was in the cause, and that success was certain. The undertaking was directed, and all the details were arranged by a committee at the Hague, consisting of Mr. Fransen Van de Putte, Mr. de Jonge, Commodore Jansen, and the Baron van Wassenaer.

It was wisely determined that the first Dutch Arctic Expedition should be on a small scale, and that it should be a summer voyage of reconnoissance. The main objects were to initiate the movement, to give experience in ice navigation to officers and men, and to examine and make scientific observations and researches in the Barents Sea between Spitzbergen and Novaya Zemlya. The patriotic sentiment of Holland was aroused by the record of the former Arctic work of her sons, which forms a proud page in her history. It was resolved that the expedition should set up memorial tablets on the scenes of former Dutch discoveries, while engaged in adding to and completing the labours of earlier days.

The vessel to be employed was a small sailing schooner, and sufficient funds having been subscribed, her keel was laid at Amsterdam, on December 1st, 1877. She was launched on the 6th of April, 1878, and named the *Willem Barents*, in memory of the greatest Dutch Arctic explorer of former days. She is a small schooner of 79 tons, 78 feet extreme length by 19 wide. By May she was ready to sail, with eighteen months' provisions on board, and equipments for deep-sea sounding and dredging, as well as magnetic and other instruments.

The officers and crew together only numbered fourteen souls, namely,

Captain.—A. de Bruyne, a First Lieutenant of the Dutch Royal Navy.

Lieutenants.—L. R. Koolemans Beynen { Second Lieutenant of the Dutch Royal
Navy.

Jonkheer H. M. Speelman

Surgeon.—Dr. Hymans van Anrooy, of the Dutch Colonial Army.

Naturalist.—Dr. Sluyter.

Photographer.—W. G. A. Grant, Esq., who was in the *Pandora* in 1876.

Boatswain.—Witteveen, of the Royal Navy.

Carpenter.—Vogelaar, of the Royal Navy.

Cook.—De Bruin. " "

Seamen.—De Witt, of the Pilot Service.

" Kamermans, " "

" Bolje, of the Pilot Service, Special Correspondent of the 'Goesche Courant.'

" Roos }
" De Waart } Fishermen of the Island of Marken in the Zuyder Zee.

The instructions were to proceed first to the island of Jan Mayen, and then to determine the edge of the west ice and of the ice to the north of Spitzbergen, returning to Bear Island. The second part of the voyage was to be devoted to an examination of the ice in the Barents Sea, and of the coast of Novaya Zemlya, from Matoshkin Shar to Cape Nassau. The Committee enjoined the captain to complete the work in one season, and to avoid being detained for a winter if possible.

On the 5th of May the *Willem Barents* left Amsterdam, and proceeded down the canal to the North Sea at Ymuyden. Her stern is ornamented with the arms of Amsterdam, her name in gilt letters is on each counter, and she has two red streaks. The bow, sharp and well adapted for charging the ice, is strengthened with iron plates. Crowds of people cheered heartily as she passed along the quays, and she was followed down the canal by the English yacht *Greta*, and by a steamer containing Commodore Jansen, several members of the Committee, and ladies, and Sir Allen Young. While in the lock the little schooner was formally christened by Miss Lucie Fransen Van de Putte, daughter of the Chairman of the Arctic Committee. The final leave was taken at Ymuyden, with many hearty Dutch cheers, and the *Willem Barents* proceeded on her adventurous voyage on the 6th of May, 1878.

From May 12th to 18th the Dutch explorers were at Bergen, and they then shaped a course to Jan Mayen Island, having to beat up against strong northerly gales. A fine view of the lone volcanic island, with its grand peak of Beerenberg, was obtained on June 9th, but a storm came on which made it impossible to land, and on the 12th they reached the edge of the west ice. From the 12th to the 18th the *Willem Barents* took soundings and was steered along the line of this ice, making good runs each day, and on the 19th she was at the north-western end of Spitzbergen. The Dutch officers anchored at a place near Cloven Cliff, called the *Zeeurschen uitkyk* ("outlook of the Zeelanders"), which was much frequented by their countrymen in the olden days. Captain de Bruyne himself is a Zeelander from Middelburg. On the 23rd they were again under weigh; on the 24th they encountered very bad weather, working along the northern shore of Spitzbergen, and on the 27th they were off Verlegen Hoek. They then went north for about twenty miles, where they were stopped by the ice, reaching their most northern point on the 27th in 80° 18' N. Thence they proceeded to Amsterdam Island, the 'Smeerenburg' of the old Dutch

whalers, where there is a graveyard and other memorials of former days. The grave-stones were arranged, and a memorial slab of granite was fixed against a cairn, in their midst, with the following inscription:—



IN MEMORIAM.

Spitsbergen or Nieu-land
discovered

up to $79^{\circ} 30'$ N. latitude
by the Hollanders.

Here wintered in 1633-34

Jacob Seegersz, and six others.

Here wintered and died in 1634-35

Andries Jansz of Middelburg

and

six others.

' In the evening of July 2nd, the *Willem Barents* departed from a spot so full of interesting associations for her officers and crew, and touched for a few hours at Robbe Bay (not Kobbe Bay, as on the Admiralty chart), on Dane's Island. This completed the Spitzbergen work. On the 4th of July they ran out to the edge of the west ice again; on the 15th they arrived at Bear Island, and on the 22nd at Vardö, in Norway, whence a report was despatched to Holland.

The *Willem Barents* sailed from Vardö on the 22nd of July, shaping a north-east course until the 27th, and then nearly due north along the 45th meridian. On the 1st of August ice was encountered in $77^{\circ} 10'$ N., and they pushed north to $77^{\circ} 54'$ N. in $44^{\circ} 20'$ E., and then proceeded westward along the edge of the ice for ten days, as far as $35^{\circ} 30'$ E. and $77^{\circ} 44'$ N., eighty miles from Wiche Island. At the most western point the vessel was nearly beset in very heavy ice, and was then driven south before a furious N.N.W. gale, passing the last ice-stream in $76^{\circ} 33'$ N. In coasting along this ice for ten days, two very distinct kinds were encountered. To the eastward the ice was thin and level, rotted by the rains and waves, and evidently only of one year's formation. But to the westward there were heavy floes of immense thickness, with big rounded hummocks, which made progress over it almost impossible. The line of demarcation between the thin east ice and the heavy western floes was reached on August 6th, in about the longitude of 38° E. The distance from this position to Franz-Josef Land is not much over 150 miles, and the best chance of reaching it in the season of 1878, appeared to be by pushing northwards, in about 45° to 50° E. Of course, the position of the heavy west floes, pressed against the eastern side of Spitzbergen, will vary according to the prevailing winds and their force in the early part of each season, and may be found even

broken up and dispersed, as was the case when Wiche Island was rediscovered.

These observations are important, because Franz-Josef Land is one of the bases whence future Arctic explorations on an adequate scale must start. By means of extended sledge journeys from a well-selected wintering place on that land, geographical results of great value and interest will hereafter be obtained; and hence all reconnaissances in the Barents Sea are extremely useful.

The *Willem Barents* next proceeded to Matoshkin Shar, the strait dividing the two islands of Novaya Zemlya, and remained there from the 20th to the 25th of August. The explorers then proceeded northwards along the Novaya Zemlya coast, and on the 3rd of September they had passed Cape Nassau, and were off Cape Troost of Barents. Their instructions precluded them from proceeding further to the eastward, so they steered north-west from Cape Nassau, in order to examine the ice in that direction. It was encountered in $78^{\circ} 17' \text{ N.}$ and 55° E. , nearly in the position of the *Isbjorn* on September 5th, 1871, and just 100 miles from Franz-Josef Land. During September there were southerly winds, and the ice was driven to the north. Leaving the position in $78^{\circ} 17' \text{ N.}$ on September 7th, a course was shaped south-east until the 8th, and then south-west, across the Barents Sea, which was clear of ice. The *Willem Barents* arrived at Hammerfest on September 23rd, sailed again on the 26th, and reached Amsterdam on the 13th of October, after a most satisfactory cruise. Experience of the ice movements between Spitzbergen and Novaya Zemlya had been acquired, a full hourly series of meteorological observations had been taken, as well as deep-sea soundings with serial temperatures, and magnetic observations by Lieutenant Speelman. Collections in natural history were also diligently made, and no opportunity was lost of adding to the knowledge of those northern seas. Mr. Grant, in spite of almost constant fogs and great difficulties owing to the extremely limited space on board, succeeded in completing an excellent series of photographs. The natural history collections have been pronounced, at Leyden, to be very valuable; and the serial temperatures, when worked out, will throw much new light on the question of warm and cold currents. The narrative of the voyage will be written by Lieutenant Koolemans Beynen; Lieutenant de Bruyne will work up the meteorological and Lieutenant Speelman the magnetic observations; while the natural history collections will be studied and described at Leyden.

The voyage of the *Willem Barents* was merely tentative. It was a reconnaissance, and was intended to be preparatory to a second effort. The officers and men carried out their instructions with ability and zeal, and succeeded in making the cruise both useful and instructive. They had a warm and enthusiastic reception on their arrival at Amsterdam. The country was proud of this first attempt, and with good reason.

On the 23rd of October a grand banquet was given to the Dutch Arctic officers at Amsterdam, with the Burgomaster Jonkheer den Tex in the chair, and upwards of ninety hosts were present, all hearty well-wishers to the Arctic cause. Among them were Commodore Jansen, the Baron van Wassenaer, Mr. de Jonge, Mr. Charles Boissevain, several Leyden students headed by Mr. Van der Vlugt, while our Society was represented by one of its secretaries, and English Arctic officers by Captain A. H. Markham, R.N. The instructed public opinion of Holland was well represented, and there could be no doubt of the feeling which existed in favour of steadily persevering in the work that had been so well commenced. Continuity of effort in geographical discovery, as in most other enterprises, deserves and generally commands success. It is this steadfastness which has enabled the Swedes at last to do great things, and which promises so well for Holland. It is this that our English attempts unfortunately lack. We send out an isolated expedition, and when it returns we allow the matter to drop, and turn to some new excitement. It is to be hoped that the spectacle of success achieved by our neighbours, by dint of continuous and persevering effort, may not be without its effect in this country.

3. THE ROUTE FOR FUTURE POLAR DISCOVERY.

THE gallant achievements of Swedish and Dutch explorers will, it is to be hoped, arouse some feeling of generous emulation in this country.

It is certainly a great advantage, in the future prosecution of polar research, that the main principles have been accepted by the authorities, and need no further advocacy. Our Government has declared* that the scientific advantages to be derived from exploring the region round the North Pole, and the importance of encouraging the spirit of maritime enterprise, are sufficient reasons for prosecuting the work. Men of science, throughout Europe, are unanimous in holding that the results of polar exploration are important; and Arctic experts of our own country, guided by all former experience, have laid down certain canons which must serve as landmarks in deciding upon future operations. We need no longer waste our time in disputing upon first principles, and we ought no longer to be adrift in a sea of controversy.

The route to be sought for is one which will lead to the most advanced attainable position,† whence the greatest extent of new coastline can be explored; because thus will the most valuable scientific results be secured. And this position must be beyond any previously reached in the same direction.

On this principle, Admiral Sherard Osborn (with the knowledge available in 1872) selected the Smith Sound route for the late Arctic

* The Prime Minister's letter to Sir Henry Rawlinson, Nov. 17th, 1874.

† R. G. S. Memorandum for the Royal Society, June, 1873.

Expedition, and he was fully justified by the result. The ships did reach positions beyond any previously attained, whence unknown country was discovered and explored. A considerable contribution was made to our knowledge of the physical geography of one part of the polar region; and in physics, geology, and natural history, the results of the Expedition have been pronounced, by the most competent authorities, to be valuable.

But Sherard Osborn selected the Smith Sound route because it was the best for reaching the desired base of operations. Consequently, in continuing the work, we must make up our minds to adopt a route which will be more difficult, and we must carefully measure and study the obstacles, in order that we may obtain equal or greater success.

There are several routes which invite investigation, namely, the completion of the discovery of Greenland, the connection of the great gap between Aldrich's furthest in 1876 and Prince Patrick's Island, the examination of the supposed lands north of Siberia, and the further exploration of Franz-Josef Land. The problem for solution lies in the selection of that route which offers the best chance of success.

In order to penetrate furthest into the unknown region, a coast-line must be selected which trends northwards, and if possible it should have a western aspect, because we know that the seas on the western sides of Arctic lands are more frequently navigable than those on the eastern sides. Another Arctic canon is that navigation in coast waters is preferable to entering the drifting pack away from land.

The western side of Franz-Josef Land trends for an unknown distance to the northward, and it has a coast facing west. It is, therefore, the best route for the next Arctic Expedition, the object of which should be to make another large contribution to our knowledge of the unknown area, and towards solving the polar problem.

Lieutenant Payer has well stated the nature of the polar question as a problem of science. "It aims at determining limits of land and water, at the perfecting of that network of lines with which comparative science seeks to surround our planet even to the Pole. The completion of this labour will serve to discover those physical laws which regulate climates, the currents of the atmosphere and the sea, and the analogies of geology with the earth as we see it." *

But the increased difficulty of future work, as compared with that of the Smith Sound route, lies in this:—that to reach the western side of Zichy Island (Franz-Josef Land), it will be necessary to run a risk by entering the pack away from land. Here is the element of uncertainty, for success in penetrating through the ice between Spitzbergen and Novaya Zemlya is dependent on the season, and on the force and direction of the winds in each year.

Much valuable information respecting the Barents Sea, between

* Payer, i. p. 56.

Spitzbergen and Novaya Zemlya, has been collected by Lieutenants Payer and Weyprecht in 1871, and by Lieutenant Beynen in 1878. The line of ice between Spitzbergen and Novaya Zemlya has frequently been examined in former days. Henry Hudson, in 1608, ran along the ice from June 12th to 26th, reaching the Novaya Zemlya coast on the latter day, in $72^{\circ} 25' N.$ He met the ice in $75^{\circ} 30'$, and it trended south-east to Novaya Zemlya. Witsen gives a chart showing Captain Wood's track in 1676, on which the ice is running from $75^{\circ} 59' N.$ to the coast of Novaya Zemlya in $74^{\circ} 40' N.$ This was from June 22nd to 26th. These examinations took place early in the season, generally in June. Late in August, and early in September, the state of the Barents Sea is very different. In 1612, Captain Jan Cornelisz-May attained a latitude of $77^{\circ} 45' N.$ early in August. But later in that month the sea becomes still clearer.

On August 31st, 1871, the *Isbjorn*, a little yacht of 70 tons, went as far north as $78^{\circ} 48' N.$ (in $42^{\circ} E.$ longitude), and even there the ice presented no obstacle to progress. To the west the ice lay thick, with strong ice blink, but to the north it was loose and open.*

Lieutenant Beynen, one month earlier, on the same meridian, fell in with the ice in $77^{\circ} 30' N.$, and the Dutch explorers cruised along it for ten days. They observed, as Payer had done, that to the westward the ice, pressing against the east coast of Spitzbergen, was of a very heavy and formidable character, while to the eastward the floes were thin and rotten. They noticed a distinct line of demarcation, in about $44^{\circ} E.$, between the heavy west ice pressing on the land, and the thin floes; and they inferred that the best chance of pushing northward would be by following this line in a powerful steamer.

These voyages show us that in June the ice is down in $75^{\circ} 30'$ to $76^{\circ} N.$, that in August it is in $77^{\circ} 30' N.$, and that in September it is loose and open, on the above meridian, even in $78^{\circ} 40' N.$ † The ice is at its minimum in September.

The south-western extreme of Franz-Josef Land, discovered by the Austrians, is in $80^{\circ} N.$, and there the coast was trending to the south-west. In $78^{\circ} 48' N.$ many signs led Payer to infer, in 1871, the near neighbourhood of land. So that the position reached by the *Isbjorn*, in September, 1871, was only 60 miles, and probably less, from land to the north, while the ice presented no serious impediment to progress.

The endeavour of an expedition must be to cross this strip of unknown sea, 50 or 60 miles wide, early in September, and to find a winter harbour on the west coast of Zichy Island, as far north as it is possible to penetrate. Thence extended sledge-travelling parties would complete the exploring work in the spring.

The successful attainment of the desired base of operations is dependent on the state of the ice in the Barents Sea, which varies each year.

* Payer, i. p. 105.

† Ibid, p. 111.

But the chances of success are, judging from the experience of Payer and Beynen, sufficiently favourable to justify an attempt in this direction. The *Discovery*, a steamer already well strengthened and admirably suited for ice navigation, might be made available for this service. If depôts are placed at Cape Nassau and on North-East Land, or some point more to the south, a second ship would not be absolutely necessary. Yet we may hope that our gallant Dutch fellow-workers will unite with us and make a joint expedition.

The plan should be to send the *Discovery* on this service in the late summer of 1879, and if the season is unfavourable, again in 1880 and 1881, until the northern land is reached, probably in the first-named year, possibly not until the third. This difficult part of the undertaking having been achieved, the result will, there is good reason to anticipate, be such a measure of success as will fully repay all the trouble and all the outlay that will be involved; for, now that the nature of the great frozen sea to the north of Grant Land is known, additional interest attaches to the exploration of the polar region in the same or higher parallels, and on different meridians. The physical causes which lead to the formation of such ice will be determined, the limits of the palæocrystic sea ascertained, and the general economy of polar oceanic movement made clear. At the same time, those numerous scientific results will be secured which always attend upon the discovery of new lands.

The complete attainment of the objects of our Government, as stated by the Prime Minister in his letter to Sir Henry Rawlinson of November 17th, 1874, can only be secured by perseverance and continuity of purpose. It is thus that the Swedes, so often led to the north by Norden-skiöld and Palander, have at length received the well-merited reward of their noble efforts. It is thus that the gallant Dutch explorers hope, and with good grounds, to perform services to geography in the far north. And thus alone can England maintain her old position as a leader in the work of Arctic discovery, a position which no loyal Fellow of this Society would like her to lose. "It can be done, and England ought to do it!"

The following discussion ensued on the reading of the Paper:—

The PRESIDENT (Lord Dufferin) said he believed it was customary on these occasions for the President to inaugurate the discussion by a few observations of his own. Were this a literary society, were this a medical or an antiquarian audience, he should perhaps be tempted, on the strength of his own Arctic experiences, to address them as an authority; but in the presence of geographers it would lay anyone open to the charge of presumption, who, having merely taken a summer cruise of pleasure in the direction of the North Pole, should venture to express an opinion on the grave questions raised by the present papers. It would be thought as unreasonable as if a gentleman inheriting the patronymic of "Bishop" were to proceed to ordain clergymen. He would therefore content himself with calling upon the various gentlemen of Arctic experience present to express their opinions.

SIR LEOPOLD M'CLINTOCK said, Englishmen could not speak from experience of the north-eastern portion of the Arctic Regions, as they have not yet made their accustomed mark there, though they had made a few good scores in the north-western part. The discovery of Franz-Josef Land was due to the Austrian Expedition, and on that discovery considerable hope for further explorations was founded. It was believed that under the lee of that land the Arctic ice would be found less impenetrable than that which the last English Expedition met with. After reading the records of the Swedes, the Danes, the Dutch, and the Austrians, he had arrived at the conclusion that as the ice presses downward from the north and east towards its only outlet—the North Atlantic—it is possible, by keeping along the western shores (which the moving ice leaves free), to penetrate northward by Franz-Josef Land, as may be done along the western shore of Spitzbergen. As the Meeting no doubt was aware, the President could speak from experience of the practicability of navigating the western shore of Spitzbergen.—Of the character of the ice beyond where the land would protect them from its pressure, nothing was known; but it would be wrong to assume that it would be similar to that which the English Expedition met with at the northern outlet of Smith Sound, because there it has a free escape, and is not pent up as it is off that narrow outlet, where it has been churned up and perhaps detained for ages. Before sitting down he felt bound to say that all English Arctic explorers, and in fact all Englishmen, wished success to the gallant Swedes and Dutch, and most cordially congratulated them upon what they had already done.

Admiral HAMILTON wished to add his word in praise of the energy, patience, and foresight displayed by the Swedish Expedition. Had Sir Leopold M'Clintock or Admiral Richards gone in that direction in 1858, he had no doubt that Englishmen would have made their score in that part of the world, as well as they had done in the north-west. Now in 1878, however, there were others who had gained some experience in the Arctic Regions, and if the learned societies could only persuade the Government to send out the *Discovery* again yearly to pursue researches, they might perhaps succeed in reaching the North Pole, as the Swedes would without doubt succeed in making the North-East Passage. The route to be followed was undoubtedly that by Franz-Josef Land. One canon in Arctic navigation, to use the words of Captain Penny, was, "Stick to the land floe." They should never take the drift pack. Another, as laid down by Sherard Osborn, was, "Stick to the western shore." If these were attended to, and Franz-Josef Land were once reached, there could be no doubt that between the ships and the sledges a higher northern latitude would be attained than ever before.

Captain FEILDEN said he quite agreed in the views that had been expressed, that the route which offered the best prospect of attaining a high northern latitude in the eastern hemisphere was that by Franz-Josef Land. The information we possessed about Barents Sea was derived principally from the observations of Lieutenant Payer, and more recently of Lieutenant Beynen of the Dutch Navy. There were one or two pregnant facts connected with Payer's narrative of the voyage of the *Isbjorn* which Mr. Markham had not touched upon. One of these was the remarkably high temperature of the sea-water, 38° or 40°, at the most northerly point reached, and the large amount of invertebrate life found there. Those who had, like himself, observed the almost azoic character of the polar current flowing down Smith Sound, as far as a surface-fauna was concerned, would agree with him that water of a temperature of 40°, and containing such an enormous amount of invertebrate life, could not possibly come from the Pole, but must be an extension of that warm current from the westward, which, for the want of a better name, was called the Gulf Stream. A still more remarkable fact was that Payer, in his sledge journey from the south

of Franz-Josef Land, on the 31st of March, found at Cape Frankfür, at the mouth of Austria Sound, thousands upon thousands of birds, and on the 11th April, when he reached Cape Auk, almost his highest point, there was open water, while the rocks were covered with multitudes of sea-birds, and the air resounded with the incessant whirring of their wings. It was evident that those birds would not go there unless there was sufficient food to support them, and they would not select such breeding-places by mere chance. No doubt their visit was an annual occurrence. He did not for one moment suppose that it was an indication of an open Polar Sea, but it was a very strong presumption that a branch of the warm current struck on the western shore of Franz-Josef Land; and when he took into consideration the thinness of the ice met with by Beynen in his last voyage, and also the heavier ice pushed away to the east of Spitzbergen, he could not but think that a strong steamer with efficient officers would not find any great difficulty in making a lodgment on the western shore of Zichy Land. It was needless to say what the result would be if Englishmen once got a firm foothold on Franz-Josef Land. A new era of Arctic enterprise would be opened up; for that experienced and reliable traveller, Payer, had stated that in latitude 83° he saw a high and mountainous country with lofty peaks. There was every hope that that land had a northern extension. It must be a matter of extreme gratification to all Arctic travellers present to have heard Mr. Markham's paper on the results of Nordenskiöld's and Beynen's voyages; but though he did not grudge them their success, he thought it would be a misfortune if England, which had received Arctic enterprise as an heritage, should give up the research. Even if she did, he was quite sure that successive generations of other nations would carry it on, until at last the flag of a civilised people floated on the northern axis of the globe.

Captain COLOMB had passed some time pretty far north in one of the former Arctic expeditions. The utilitarian would always ask, "What are we to get by all these expeditions?" Mr. Markham's history of the mere commercial results of the discoveries along the northern coast of Siberia ought to be a sufficient answer. There were also the valuable scientific results which continued to be obtained from researches in northern seas. But, after all, the real incentive to Arctic exploration was the same as that which made a man who had seen another jump 23 feet 6 inches, determine in his own mind that he would jump 23 feet 6½ inches. But dispensing with mere *badinage*, he considered that there was a real necessity for England in times of peace to develop naval enterprise. Every naval officer in such times had a tendency to subside into routine, and to acquire a habit of thinking that in doing the current work of the day he did enough. But such a man would not act satisfactorily when the emergency of war arose. The best thing that could be done was to train such men to deal with the emergencies which most nearly resembled those of war. The combat which Arctic explorers had to wage with ice, and cold, darkness and privation, and suffering of all kinds, afforded exactly that sort of training which would best fit them to act effectually when the necessity arose. He noticed that Mr. Markham in his papers had several times referred to the power of a heavy steamer to penetrate through the ice. He himself happened to have been in a heavy steamer when he passed through the Middle Pack in Baffin's Bay, and the ship forced her way through by sheer weight. A light ship could not have accomplished it. An ordinary floe would rarely stop a ship of 1500 or 1600 tons weight, if properly prepared. If such a ship proceeded by way of Franz-Josef Land, supposing that the land there trended to the north, he thought a single summer would suffice to take her to a very much higher latitude than had yet been reached.

Sir ALLEN YOUNG said that although commercial questions were not the special object of the Royal Geographical Society, they could not fail to take note of the impor-

tant fact that the Arctic seaboard of Asia was being gradually opened up to commerce, and that its products were finding their way into this country. Those products consisted not only of cereals, but graphite and fossil ivory, and too much importance could not be attached to the voyages which opened up such a region. According to the latest accounts, the Swedish Expedition had only some 1200 miles to traverse before reaching Behring Strait. At any moment news might arrive of their safely reaching Japan. Of course some delay might arise, because the telegraphic communication had to pass through China; but he hoped that before Christmas it would be known that they had successfully completed a voyage, which would be one of the most wonderful on record. Not only in its commercial, but in its scientific results it would throw many previous voyages into the shade. With reference to the Dutch Expedition, he was in Holland when it started. It consisted of a small ship without steam power, and considering all they had at their disposal, the voyage had been a most successful one. When their observations were worked out, most valuable results would be obtained from their deep-sea soundings, and their notices of the currents and the movement of the ice. He quite agreed with the previous speakers in their opinion as to the advisability of England's continuing Arctic research, and in their advocacy of the route along the west coast of Franz-Josef Land as that which offered the most favourable prospect of reaching a higher latitude than has yet been attained.

Captain MARKHAM said his own opinions with regard to the best route to be selected by future Polar explorers were almost identical with those which had been generally expressed that evening. It was, he thought, an almost established fact, that to ensure success in exploration in the Arctic Regions, a coast-line was essentially necessary, along which the sledge parties could travel after leaving their ship secure in winter quarters. According to the present limited knowledge of the conditions of land north of 82° latitude, such a coast-line could only be found in Franz-Josef Land; for Lieutenant Payer, whose authority was unquestionable, reported that Franz-Josef Land extended as far north as 83° , and in all probability it will be found to extend a considerable distance beyond that. From information which he had personally obtained from the recently returned members of the Dutch Expedition, he was more than ever convinced that by the exercise of patience and skill on the part of her commander, a ship could with safety reach the south-west extreme of Franz-Josef Land. The Meeting had been told that the ice on the western side of the Sea of Barents was of a very heavy nature, and he had been informed by the Dutch officers that it partook of the character of the heavy palæocrystic floes that were met with north of Smith Sound; while the ice on the eastern side was of one season's formation; between these two there was a distinct line of demarcation through which a powerful steamer he thought could very easily make a passage. Another reason why the route by Franz-Josef Land should be selected in preference to all others, was that two ships were not absolutely necessary; in fact, he would even go so far as to say that the work would be done better by one, for it was far easier for one ship to push on quickly and take advantage of every little opening in the ice, than if she was hampered by the movements of another; whilst the anxiety and responsibility on the part of the leader would, of course, be proportionately diminished. The ice in the Barents Sea was more open between about the 40th or 45th meridians of longitude about the end of August or beginning of September than at any other time. Prior to that period, therefore, the exploring ship could be usefully employed in establishing one or two large depôts of provisions on the western coast of Novaya Zemlya, where also boats could be left, and thus the necessity of having a second ship would be done away with. He believed that next year the Dutch, the Swedes, and the Americans would in all probability be carrying

out their researches in the Arctic Regions, and he hoped that the English Government also would be induced to authorise the despatch of a vessel, if not to co-operate with those of other countries, at any rate to share in the great and useful work.

The PRESIDENT, in concluding the proceedings, wished to remark that there had been one omission in the arguments which had been adduced in favour of England prosecuting further researches in the direction of the North Pole. Next to Russia, England was the greatest Arctic Power in the world. Though from the happy absence of crime in that neighbourhood the Canadian Government had not had occasion to establish judges there, it should not be forgotten that the Queen's writ now runs to the North Pole, and the least that a country could do was to examine its territorial boundaries.

The Mountain Passes on the Afghan Frontier of British India.

By C. R. MARKHAM, C.B., Secretary R.G.S.

Map, p. 80.

THE ranges of mountains which form the north-west frontier of British India compose a system which may be separately studied, although they are connected by an unbroken water-parting with the Hindu Kush and the outer Himálaya.

The mountains of the Hindu Kush are the boundaries of the Afghan valleys on one side, whence the Kabul River flows direct to the Indus, and the river of Kandahar to its inland receiving lake. On the other side are the Sulimani mountain ranges, which (considered as one system) present an unbroken line completely separating the drainage of the Afghan valleys from that of the Indus.

A ridge, forming the water-parting between the Ghazni and Kabul basins, shoots off from the Hindu Kush, and its continuation, running east and west, forms the lofty range of the Safid-Koh. The River Kabul washes its northern base, and its long parallel spurs extend to the Indus.

The Safid-Koh is the northern portion of the system which forms the subject of the present paper. Its limit in a northerly direction is the right bank of the Kabul River. From the southern face of that range, a system of mountains, with parallel ridges and many spurs, extends in one continuous line to the Arabian Sea, and forms the north-western boundary of British India. It is generally known as the Sulimani Range, but it includes more than one chain, and a closer study of its general features will show the necessity for a stricter definition of its several parts.

Like the Himálaya, the Sulimani system consists of an inner chain on which most of the rivers flowing to the Indus rise, with a continuous unbroken ridge, a central chain, and an outer chain, with lofty peaks and deep gorges, through which the rivers force their way into the Indus plain. The country between these chains consists of numerous transverse and parallel ridges and valleys, and several remarkable plateaus; and in some parts of the outer line there are indications of a formation

analogous to the Dhúns and Sewaliks of the Himálayan system. The easternmost or outer chain, rising from the plains of India, is known as the Koh-i-Surkh or red range, and the inner chain is called the Koh-i-Siyah or black range. The famous peak of Takht-i-Suliman, or "throne of Solomon," is on this outer range, and the name of Sulimani should, therefore, be applied to it; while the inner range, forming the water-parting between India and the inland Afghan valleys should, for the sake of precision, have a distinct name. It commences from the Safid-Koh, and runs in a general north and south direction to the lofty peaks of Tukatu, overlooking the Bolan Pass. It has been proposed to give the name of Jadran to this inner range, in accordance with the views of Captain Broadfoot. That distinguished explorer gave this name to what he calls the chief of the Sulimaui Chain, which he himself saw joining the last roots of the Safid-Koh, and he held that it continued, under different names, to near Kwatah (Quetta). The name is derived from the wild Jadrans who occupy part of the eastern slopes. But, on the whole, and keeping in mind the analogy of the Himálayan system, it will be most conducive to clearness and accuracy of statement, if we adopt the terms western and eastern Sulimani, for the inner and outer chains respectively.

South of the Bolan Pass, the mountain range continues to the Arabian Sea at Cape Monze, a distance of 350 miles. Pottinger, on his map, called this chain the Brahuik Mountains, the Brahuís forming an important part of the population of Baluchistan. Mr. Hughes has used the same nomenclature in his recent work on Baluchistan. But the term "Hala Mountains" appears to have been more generally adopted, and will, therefore, be used in this paper.

The mountain region which will be the subject of our study and discussion, consists of the Safid-Koh Range, running east and west from the Hindu Kush to the Indus; of the three parallel chains of the eastern, central, and western Sulimanis, running north and south from the Safid-Koh to the Bolan Pass; and of the Hala Mountains extending thence to the Arabian Sea at Cape Monze. The mountains are inhabited by Pathan or Afghan tribes in the northern, and by Baluch tribes in the southern part; the whole of the Hala Range, and part of the eastern Sulimani north of the Bolan Pass, being occupied by the latter.

Our knowledge of this mountainous region is still very imperfect, and is mainly derived from the narratives of travellers who have crossed it at a few points, and from the reports of officers accompanying expeditionary forces. It is necessary to piece together the scattered information so as to bring it into one focus, and to make some approach to systematic arrangement of existing materials, if we would acquire a general knowledge of the important region under discussion. With this object I propose to commence from the northern extremity on the right bank of the Kabul River, and to make a contribution towards describing each

pass, and the locality of each tribe from north to south, until we reach the southern extreme of the Hala Mountains. At best our view will be incomplete, and in some places hazy and doubtful; but it will be an honest, and therefore useful, attempt to take stock of the knowledge we now possess.

The Sulimani Mountains are interesting, not only from their geographical importance, but from the historical associations attaching to them, and from their having contained, in all ages, the gates to the rich empire of India. The plants, on their eastern slopes, yielding the sacred soma juice, and wood mentioned in the Rig Veda hymns, bear silent but unerring testimony to the roads by which the earliest Aryan settlers found their way into the valley of the Indus. It was along the perilous route on the northern face of the Safid-Koh that the early Chinese pilgrims reached the revered sites of Gautama's ministrations, and by the same way Alexander and his Greeks marched to the conquest of the Punjab. In November, 1001, Mahmud of Ghazni came down the valley of the Kabul River with ten thousand horsemen; and he returned to Ghazni by a more southern pass. Muhammad Ghorî traversed the defiles of the Sulimani in 1191, and his lieutenant Ilduz kept the road open from the Indus to Ghazni by the Kurram Pass. Down the self-same pass the heroic prince Jalâlu'd-Dîn of Khuwârizm was hunted by Chingiz Khan, and driven into the Indus; and the conquering Timur also used the Kurram route for his invasion of India. Baber, the founder of the dynasty of the "Great Moguls," traversed the Khaibar and the Gomul. He knew most of the passes, and was the first geographer among the conquerors of India. His topographical descriptions are masterly, and Captain Broadfoot, who followed on several of his tracks, only once thought that he had detected him indulging in oriental exaggeration.* Baber's descendants at one time turned the current of invasion in the opposite direction, and scaled the Sulimani Mountains with aggressive armies collected on the plains of India. Thus, a son of the Emperor Shah Jehan marched up the Sanghar Pass to Kandahar; but the tide soon turned again, and in the last century Nadir Shah and Ahmed Durani led conquering hordes down the Khaibar and Bolan passes. In our own day we once more see the rulers of India advancing up from the plains to the mountain *subahs* of Afghanistan, which were included in the empire of their predecessors, to avert the possibility of another invasion of Hindustan by the gates of the Sulimani Range.

The extraordinary historical interest thus attaching to this mountain

* Baber visited the shores of the Lake Abistada, and he says that the number of waterfowl was innumerable, and that a reddish tinge was given to the mass when they turned their wings in the air. When Broadfoot passed by the lake he saw few or no birds, and therefore suspected the royal author of exaggeration. But Masson, who also visited Lake Abistada, says that there were vast numbers of birds, and moreover that they had red legs; which is a remarkable corroboration of Baber's narrative (i. p. 261).

frontier enhances the importance of systematising and arranging the geographical knowledge connected with it. The range also presents certain peculiarities from its position, which make its examination specially desirable for the furtherance of several branches of scientific investigation in their relations to geography. For instance, as regards botany, the exploration of the Sulimani Mountains will tend to show the relative distribution of members of the Persian and Indian *floras* which lie on either side of them; and the same interest attaches, for similar reasons, to researches in zoology. Beyond the collection of a few fossils in the nummulitic limestones, and the hasty descriptions of rock formations by passing travellers, the geology of the range is unknown.*

The Safid-Koh, its Spurs and Defiles.—We will now commence our survey of the region with the Safid-Koh Range, and the spurs from it to the north and east, including the Khaibar and Karkacha passes. We are able to do so under very efficient guidance, for this country has been described by Elphinstone and Macartney; was explored by Burnes, Leech and Lord, by Lieutenants Wood and Mackeson, by Moorcroft, Vigne and Masson, and was traversed by the forces of Wade, Pollock, and Nott.

The Safid-Koh Range, rising out of the high table-land which separates the Kabul and Ghazni basins, follows the 34th parallel of latitude for about a hundred miles, then sends one arm to the north-east, terminating on the Kabul River, which makes a great curve northwards to flow round its base. The main range continues eastward to the Indus between Kohat and Peshawur. The highest peak is the Sikaram † Mountain, 15,622 feet above the sea, whence the range preserves a tolerably uniform level, perhaps nowhere less than 12,500 feet, until it again culminates in a double-peaked mountain, whose summit average is 14,800 feet. ‡ The first northern spur of the Safid-Koh is the water-parting which divides the valley of the Logar River from that of the

* Vigne says that it consists of recent formations, principally sandstone and secondary limestone; and that the fossiliferous portions contain ammonites and marine remains. The strata, he adds, are much shattered and contorted, and often overlaid by shingle or debris. A few nummulites were exhibited at the Punjab Exhibition of 1864 from the Derah Ghazi Khan district. The natives relate that the larger fossils are the petrified clothes of fifty betrothed virgins. They were once surprised while bathing by their future husbands. They prayed heaven to grant them a covering, and in answer to their petition the earth swallowed them up, and their clothes became stones. There were also belemnites, and several species of echinus, at the Exhibition. Dr. Fleming described the nummulitic limestones of the Sulimani Range, above the Derajat, in the 'Quarterly Journal of the Geological Society,' ix. p. 346.

The Trans-Indus Salt Range was surveyed by Mr. Wynne of the Geological Survey, accompanied by Dr. Warth, in 1873; and Dr. Waagen examined the relations and mode of occurrence of the fossils in the Salt Range.

† Or Sitaram.

‡ Colonel Walker, 'R. G. S. J.,' 1862.

Khurd Kabul. Here is the defile of evil fame, commencing about 10 miles east of the city of Kabul, 6 miles long, with a width of 100 to 200 yards, and high mountains on either side, the road crossing the stream which flows down it twenty-three times. When Sir Robert Sale forced it in 1841, it was defended by 200 Ghilzis, and he lost 67 men; while on the 8th of January, 1842, the retreating garrison of Kabul, under General Elphinstone, was attacked at the head of the defile; a panic ensued, baggage and arms were abandoned, and 3000 souls are believed to have perished.

The next northern spur from the Safid-Koh is crossed by the Tangi Takhi Pass, and the next is crossed by the Haft Kotul Pass. The latter name signifies "seven passes," and the pass is about three miles long. Here Sale fought a gallant and successful action, here the massacre of the retreating garrison of Kabul was continued, and here the Afghans were defeated with great slaughter by General Pollock, in September, 1842. Next comes a higher range, forming the boundary of the Tezin Valley, which is called by Wood the Karkacha Range. It extends to the right bank of the Kabul. That river separates it from a chain on the opposite side, which may be traced from the outskirts of Kafirstan, above Swat and Khagan, in continuation of the Himálaya in Kashmir. Thus the Karkacha may perhaps be considered as a connecting link between the Himálaya and Sulimani ranges. The Tezin River has a northerly course, from the Safid-Koh to the Kabul, of about 40 miles. It flows through a valley which is partly cultivated, and four passes lead from it over the Karkacha Hills, namely, the Karkacha, the Sokhta, the Chinár, and the Lataband. The Lataband Pass, which was used by Sir A. Burnes in 1832, is 6 miles long. It turns the Khurd Kabul, and the city of Kabul is in sight from its summit. The Karkacha Pass is the highest and most southerly,* being nearly 8000 feet above the sea. It was explored by Lieutenant Wood in September, 1837, who followed up the bed of a stream called the Hisarak until it contracted to a narrow defile 10 feet wide, the sides of which were naked, craggy, and precipitous. From the summit of the pass there is a glorious view of the mountain chains round Kabul, and the slopes are covered with almond-trees and wild flowers. The mountains are of blue slate. In the Tezin Valley Sir Robert Sale defeated an Afghan force on 22nd October, 1841, when on his march to Jalalabad. The remnant of the retreating garrison of Kabul, under Brigadier Shelton, reached Tezin on the 11th of January, 1842; and here General Pollock fought an action on the 12th of September, 1842.

The narrow and winding defile of Jagdallak,† in which the last remnant of the Kabul garrison was massacred on the 12th of January,

* In Wood's 'Oxus' there is a misprint of northerly for southerly.

† Colonel Yule identifies the "Ghideli" of Benedict Goes, and the "Djeguid-Ali" of Forster with Jagdallak. 'Cathay,' &c., ii. p. 556 (n).

1842, constitutes the first passage over the Karkacha, and leads to the three more northern passes over that range.

Between the Karkacha and Khaibar ranges there is an extensive valley, bounded on the south by the lofty Safid-Koh, on the north by the Kabul River, and intersected by lower hills. It is about 80 miles long by 35, and in many parts is highly cultivated. Jalalabad, surrounded by fields and fruit-gardens, stands near its midst, and several streams, the chief of which is the Surkh-rud, flow across it to the Kabul. The district including the slopes in the southern part of the valley of Jalalabad is called Nangnahar, not, as Lieutenant Wood supposed, because it contains nine rivers,* for the word is, as Colonel Yule explains, but a corruption of the ancient Indian name Nagarahâra (the Nagara of Ptolemy), written in Baber's time Nagarhâr. Baber also calls it Adinapur,† and the plain is the *Gernsil* or hot, as distinguished from the *Serdsil* or cold country. In 1508 Baber made a garden at Adinapur. To the westward of Jalalabad, on the north side of the Kabul, is the small district of Lamghan or Laghman, surrounded by mountains; and it was through it that the Chinese pilgrim Hiouen Tshang approached India, crossing the Kabul River opposite Jalalabad. This seems to have been a usual route, for the Emperor Baber, in his 'Memoirs,' mentions, among four roads which lead from Kabul to Hindustan, "one by way of Lamghanat, which comes by the hill of Khaibar, in which there is one short hill pass." Thus the route appears to have followed the left bank of the Kabul through Lamghan, then to have crossed the river at Jalalabad, and entered the Khaibar defile. Masson made an excursion to Lamghan, crossing the river near Jalalabad.‡ East of Jalalabad a spur from the Safid-Koh stretches out to the River Kabul, and is crossed by a pass called the Khurd-Khaibar opposite to Lalpura. Two miles from the entrance of the Khaibar defile are the two villages and fort of Daka (1404 feet above the sea), about half a mile from the right bank of the Kabul; while on the opposite shore is the town of Lalpura, the chief place of the Mohmand tribe. A ferry of boats, and a difficult ford, when the river is low, connect the two places.

East of the Jalalabad Plain is the Khaibar Range, joined by a ridge to the northern face of the Safid-Koh. The range goes north for 15 miles, then spreads east and west, with spurs to the Kabul River, having a length of 35 and a width of about 15 miles. The connecting ridge is only 3400 feet above the sea, but the chain rises again in the Tartara Peak (6800 feet above the sea), which overlooks the Kabul River, and the valley of Peshawur. Two streams rise on the connecting ridge, one flowing north-west to the Kabul River, the other south of east to the

* Wood's 'Oxus,' p. 105, 2nd ed.

† Masson identified the site of Adinapur (i. pp. 182, 183).

‡ Masson, iii. pp. 285, 297.

Peshawur Valley at Jamrûd. The beds of these streams form the Khaibar Pass. The actual eastern entrance of the Khaibar defile is at Kadam, 3 miles beyond Jamrûd, where the hills close in on either side, and the width of the pass is 450 feet. Further on it narrows to 190 and then to 70 feet, and at Ali Masjid the width of the pass is 150 yards, with almost perpendicular sides. Ali Masjid (2433 feet above the sea) is a fort built on a conical hill 600 feet high, on the south side of the pass. Here the water is clear but unwholesome, owing to being impregnated with antimony. Ali Masjid is 8 miles from the entrance of the pass, 26 from Peshawur, and 67 from Jalalabad. Further on, in the Lalabeg Valley, the pass widens to a mile and a half, but it closes in again to a narrow gorge with precipices on either side, before the Landikhana Pass is reached on the connecting ridge (3373 feet), whence the descent is easy to Daka in the plain of Jalalabad, which is 1404 feet above the sea. The whole distance through the Khaibar Pass, from Jamrûd to Daka, is 33 miles, with an easy gradient along the torrent beds, practicable for carts all the way. But there is danger of sudden rains in July and August, and also in December and January, when the roadway is converted into a torrent. Lieutenant Wood tells us that, when he was in the pass, the waters came down so rapidly, and the little rill swelled so quickly into an impassable stream, that the party was divided, some having sought shelter on the right and others on the left bank.

The Khaibar Pass, as we have seen, was that used by Alexander the Great, by Mahmud of Ghazni, by Baber on more than one occasion, and by Nadir Shah; and to every invading army the Afridi mountaineers gave serious trouble if they were not bought off. By this perilous road came Benedict Goes, Forster, and many an earlier wayfarer; by it travelled Moorcroft, Masson, and Vigne; and in 1837 Burnes, Lord, and Wood. In 1839 it became the scene of operations of British troops. On the 22nd of July, Colonel Wade, with an army of 10,000 men, entered the pass and captured the fort of Ali Masjid on the 27th, after an encounter, in which the British loss was 22 killed and 158 wounded. He met with no further opposition. A strong post was left at Ali Masjid; and another under Lieutenant Mackeson near Daka, to keep open communications with Peshawur. When Jalalabad was blockaded, it was proposed to send a force to the relief of Sale's garrison. On January 15th, 1842, Colonel Moseley reached Ali Masjid, but Brigadier Wilde, who followed him, was repulsed with heavy loss. Moseley was then forced to fight his way back through the pass, with a loss of 32 killed and 157 wounded. General Pollock advanced on April 6th, 1842, and was fiercely resisted at the entrance of the gorge, but the Afridis were routed and made no further resistance, the British loss being 14 killed and 114 wounded. On the return the British army was in three divisions. Pollock marched through without any casualty; but the second division, and the third, under Nott, were attacked three times, and suffered losses.

There is another pass over the Khaibar Range, to the north, and nearer the Kabul River, called the Tartara route. It leaves the Jalalabad Plain at Daka, and goes over very difficult and rugged mountains to Peshawur, a distance of 32 miles, emerging into that valley 9 miles north of Jamrud. Following the course of the Kabul for 4 miles, the road then ascends the mountains to a plain, 6 miles wide, where the Abkhana route branches off. Four miles further on, at Luadgai, a path leads off into the Khaibar defile, while the Tartara road goes over a succession of steep hills to the Peshawur Valley, winding round the Tartara Peak.* The Abkhana route leads down to a ferry over the Kabul, 12 miles above the point where that river enters the Peshawur Valley. The passage over the river is made on rafts of inflated bullocks' hides, where it is 120 yards wide, and very rapid. The precipices rise from the river banks to a height of 2000 feet, and the road goes up the Haidar Khan Mountain, whence the distance is 10 miles to the Michni fort, near Peshawur, over spurs of the Mohmand Mountains, on which the olive-trees grow in abundance. North of the Abkhana is the Karapa Pass, which leads from the Michni fort to a district on the Kabul River called Gushtia, about 25 miles below Jalalabad. Masson travelled by the Tartara Pass.† and the Abkhana route was used by Sir A. Burnes on his way to Kabul in April, 1832,‡ and also by Masson.§

We now turn from the northern to the eastern offshoots of the Safid-Koh. Colonel Walker describes them as being remarkable for their parallelism with each other and with the parent range. The main range stretches away to Attock on the Indus, dividing the Peshawur Valley, of which it forms the southern boundary, from the valleys of the Kohat district. Higher up it deflects to the southward, to separate the Tira Valley from Kurman Durrah and the Zaimukht country. Then, passing eastward from the Dullunai-Sir Peak, to the south of the Tira Valley, it separates the affluents of the Khaibar River from those of the Kohat streams. A series of spurs from the Khaibar Range separate, in succession, the Tira, Bara, and Khaibar valleys. The Bara River rises on the eastern slopes of the Safid-Koh, runs east for 40 miles, joins the Tira, and the united stream flows north-east to the Kabul, passing within 2 miles of Peshawur. The water of this river is excellent, and the renowned Bara rice is said to derive its fine quality from the water which irrigates it.|| The valley is in places very narrow, and is thickly studded with hamlets and little towers. Another smaller valley called Bazar, containing the village of Chura, is also fertile and well peopled, and there are paths from it to Jamrud and

* After the battle of Gujrat and occupation of Peshawur, Sir Henry Green, Sir William Merewether, and Colonel J. T. Walker reached the summit of the Tartara Peak.

† Masson, iii. p. 222.

‡ 'Travels into Bokhara. An Account of a Journey from India to Cabool, Tartary, and Persia,' &c. 3 vols. 8vo., 1834.

§ Masson, iii. p. 240.

|| Ibid., p. 233.

Ali Masjid. The Tira and Bara valleys are separated by a range called Aranga to the west, Shetafi in the middle, and Mulagarh to the east. It is about 7000 feet high. The Tira Valley is about 5500 feet above the sea, almost circular, with a diameter of 5 miles, and further up there is a succession of open spaces, divided from each other by narrow *tangis* or defiles, along the banks of the river. To the south another offshoot, originating from the Safid-Koh, runs due east to the junction of the Kohat and Hangu rivers, and is called the Samana Range. It divides the Khankai Valley from the Miranzai and Hangu, and, commencing at 9000 feet, its height gradually decreases to 6600 feet.

The singular parallelism of the Safid-Koh offshoots is a remarkable feature. In the low sandstone ranges the valleys are straight and parallel to each other, and are connected at right angles by abrupt gorges. In the limestone ranges the north-western faces are uniform slopes, while the opposite sides are scarped and rugged, and overhang spurs separated by deep gorges, which are very difficult of access. In the high sandstone ranges the western slopes are similarly smooth from top to bottom, and the rocks invariably wear away in layers parallel to the original stratification, so that the features of the range are little altered by degradation, and are never rounded off. The watercourses are limited to two directions, which are either perpendicular or parallel to the trend of the range, and it is thus their special characteristic to be incessantly turning corners at right angles. High table-lands are sometimes formed in the trough between two ranges of sandstone and limestone when in close juxtaposition, but otherwise the crests are but a few feet wide, often narrowing to mere knife-edges, with a perpendicular drop on one side and a slope of 60° on the other.*

The inhabitants of the Safid-Koh and its offshoots have been famous for many centuries as audacious robbers. In the extreme north the Mohmands dominate the left bank of the Kabul, and levy tolls at Daka from travellers using the Tartara, Abkhana, and Karapa passes. Their six clans number about 16,000 fighting men. The Afridis occupy the lower and easternmost slopes of the Safid-Koh, including the Khaibar Pass, the valley of Bara, part of those of Bazar (Chura) and Tira, and the range between Peshawur and Kohat. Their limits are from the easternmost spur of the Tartara Ridge to the Tartara Peak, along the crest of the north side of the Khaibar defile to the connecting ridge over which runs the Landikhana Pass, then across the Safid-Koh to the Bara Valley, down to the Kohat Pass, and round the foot of the hills to Jamrud. They make their way up wild glens from the Khaibar Pass to the Bara Valley. Of their 23,000 fighting men, some 500 serve in the Punjab frontier force. They are fine, tall, athletic highlanders, lean but muscular, with long gaunt faces, high noses and cheek-bones, and fairish complexions. They are brave and hardy, but avaricious and murderous

* Colonel Walker.

robbers, and very treacherous. On the Kohat Range, however, they have become traders, selling firewood and carrying salt to Swat and even to Chitral. In winter they live in caves in the cliffs, and in summer in mat tents. The Tira Valley is occupied by the Orakzais, another Pathan tribe, separated from the Afridis by the water-parting of the Tira and Bara. The tribe is divided into four main sections, the whole numbering 29,000 fighting men. Since 1855 they have been very troublesome neighbours to the more settled Kohat districts.

The Kurram Pass.—South of the Safid-Koh, where the Sulimani ranges begin, there is a drainage system extending over a large area, the streams of which converge to the Kurram, a river flowing in a south-east direction across the Bannu district to the Indus. The Kurram rises at the junction of the western Sulimani Range with the Safid-Koh; being formed by the Keriab, the Hariab (Huryab of Elphinstone), and streams from the Mangal country, which unite below a place called Ali-khel (7500 feet above the sea). Thence the combined waters enter the valley, and flow eastwards past the Kurram fort to the village of Thal in Miranzai, which is 42 miles from Bannu. The river then turns south-east, receiving the Shamil and Tochi rivers from Khost and Dawar. The river-basin within the hills, between the eastern and western Sulimani ranges, is of considerable extent, including the main valleys of Kurram, Khost, and Dawar, besides some subsidiary valleys, such as Fummul, at the back of Khost, which is watered by the Tochi, in its upper course. On the north it is bounded by the snowy heights of the Safid-Koh, and on the west by the western Sulimani Range, which forms the water-parting between the Indus and the Afghan drainages.

The Kurram district is about 60 miles long by from 3 to 10 wide. The valley is very beautiful, with the Safid-Koh looking down in great majesty on the smiling green fields and pleasant orchards. The climate is agreeable, and the clear and rapid river renders the supply of water abundant, and irrigates the rice-fields on either side. The water rushes in a winding and rocky bed down the centre of a deep fillet of rich cultivation sprinkled with villages, each with its clump of magnificent plane-trees, while the distance is everywhere closed by the ever-varying aspect of the noble mountains which tower over the valley in its whole length. The road enters the valley at Thal, 66 miles from Kohat and 50 from the Kurram fort, and proceeds along the banks of the river. There is an alternative route, leaving the main road about 36 miles further on, and passing over the Darwaza Pass, where there is good grazing ground, to Kurram. The fort of Kurram (6000 feet) is a square enclosure with round towers at the angles and in the centre of each face, and an inner square forming a citadel. At a distance of 25 miles from the Kurram fort, up the valley, is the village

of Paiwar, at the foot of a narrow gorge. Here it is necessary to cross a steep spur which forms one root of the Sikaram Peak, the loftiest of the Safid-Koh Range. Over this spur there are two roads, one by the Paiwar Pass, and the other, higher up, called the Ispingwai Pass. By the Paiwar the road leads over several deep ravines with oak jungle, and then up a zigzag ascent, with the hills on either hand covered with pine forests. The descent on the other side is gradual. The fine timber grown on these mountains is floated down the river to Bannu. The actual ascent was estimated at 1000 feet, and the crest of the Paiwar Pass is 8000 feet above the sea. From the Paiwar there is a descent to Ali-khel, and then an ascent to a camping-ground called Hazaradarakht ("Thousand trees"), which is covered with snow in winter; but in summer the short sweet grass, with stunted growth of *artemisia*, orchises, and lilies, affords good pasture. From this place a pass leads over the Safid-Koh into the Kabul basin, which is frequented by traders of the Jaji tribe. Masson visited a place called Murkhi Khel in the plain of Jalalabad, which is at the foot of another road leading over the Safid-Koh into the Kurram Valley. Here he saw many Jajis who had come over the pass.* From Hazaradarakht the Shutar-Gardan Pass ("Camel's neck") is reached, which crosses the Safid-Koh. The *Shutar-Gardan* is 11,200 feet above the sea. The descent into the Logar Valley is long and steep, with sharp zigzags. The pass is overhung with huge masses of naked limestone rock cropping out in every direction,† and the mountains have a rugged aspect. The country between the Paiwar and Shutar-Gardan passes, comprising the Upper Kurram Valley, is called Huryab by Elphinstone, and is the Iryâb of Timur's historians.

South of the Kurram Valley is that of Khost, which is watered by the Shamil River (or Keyti), a tributary of the Kurram. This valley is 40 miles in length, is fertile and productive, while the surrounding mountains afford plenty of timber and pasturage. Khost contains many small villages, and a population of about 12,000. Between Khost and the western Sulimanis is the valley of Furmul, with a river forming the head-waters of the Tochi. It is inhabited by Tajiks speaking Persian, who have one village called Urghun, and are chiefly occupied in smelting iron.‡ Parts of the valley are also occupied by the Karotis. East of the Furmul and south of the Khost valley are the upper and lower Dawar valleys, separated by the Tograi Tangi Pass, and surrounded by mountains. Together they are 40 miles long, both being fertile, and well watered by the River Tochi, which has the name of Gambila lower down at Bannu, and is a tributary of the Kurram. The villages are walled, and every field is defended by a tower. The surrounding mountains are snow-covered for three months, but there are good pastures on their slopes, and the people have large herds and flocks, and

* Masson, iii. p. 302.

† Lumsden.

‡ Broadfoot.

raise crops of grain, which is exported. The population of Dawar is about 25,000, and there is a steady trade, by roads practicable for camels, to Khost and Waziristan. The road to Dawar from the plains leads up the Tochi River, crossing and recrossing it seventeen times. There is a way over the Shinki-Kotal Pass, and another, longer and steeper, by the Baran. A third route to Dawar is by the Khosora Pass, which leads into the Tochi Valley, its mouth being 6 miles to the south-west.

Thus the Kurram system includes the mountain valleys of Kurram, Hariab, Kerman, Furnal, Khost, and Dawar. The inhabitants belong to various tribes. In the upper part of the Kurram Valley are the Jajis and the Mangals. The former extend from the Shutar-Gardan Pass to the Paiwar, and are believed to number about eight hundred families in eight different *khels* or clans, but their numbers have been much reduced by constant intestine feuds. Their strongly-built houses are often blockaded by enemies, as well as by the snow, and are pierced with rows of apertures for shooting through, and for use as chimneys or ventilators. The Jajis are of the Shiah sect—a hardy, but very dirty race. They breed mules, which are much in demand at Kabul. The Mangals are not only in the upper part of the Kurram Valley, but extend over the western Sulimani Mountains into Zurmat, and levy tolls on the Paiwar Pass. Lower down the Kurram Valley dwell the Turis, who have a blood feud with the Jajis, though both belong to the Shiah sect. Neither are considered to be Afghans, but both are supposed to be of Mongol descent. The five *khels* or clans of the Turis number about 5000 men. It appears that the Bangash tribe, many of whom also inhabit the Kurram Valley, formerly possessed the whole, but that they were conquered by the Turis, and are now subject to them. The Bangash are Pathans, and also inhabit the Miranzai and Kohat valleys, mustering about 15,000 fighting men. On the north side of the Lower Kurram, between that valley and the Miranzai, dwell the Zaimnkht Afghans, counting some 4500 fighting men.

The Kurram Pass, being the direct road from Bannu to Ghazni, has been for centuries looked upon as one of the most important routes across the Sulimani Mountains. In the days when Muhammad Ghori ruled in Hindustan (1193–1205 A.D.), Kurram was the seat of government of his lieutenant Ilduz, who coined money there,* and it was from Kurram that Ilduz advanced over the Shutar-Gardan and conquered Ghazni. It was, as we have already pointed out, down the Kurram Pass that Chingiz Khan hunted the Prince of Khwarizm, in September, 1221; but we have a clearer account of Timur's use of the same road, from his historian, Sherifu'd-Din Ali of Yezd. In 1398, Timur's grandson, Pir Muhammad, had advanced into the valley of the Indus from Kandahar, and laid siege to Multan. The resistance was protracted, and this induced Timur himself to invade India. He set out

* Thomas's 'Pathan Kings,' p. 27.

from Kabul on the 31st of August, 1398, and reached a place called Iryâb, which General Cunningham tells us was in the Khost Valley, but it is really the Upper Kurram Valley, called Huryab by Elphinstone, and the Hariab of the present day. He then took a route by "Shenûzaun" and "Keptcheghai" to the fortress of Nagar or Nugher, where he arrived by forced marches on September 3rd, after punishing a marauding tribe with great severity. The dates in Price* cannot be correct; but, Iryâb being in the Upper Kurram Valley, Nagar was lower down in the direction of Bannu. Accordingly Nagar has been identified, by Masson, with Kafr-Kot, a remarkable ruin near Bannu.† Timur went thence to Bannu, and crossed the Indus on September 23rd. When he returned he again used the Kurram Pass, leaving Bannu on March 11th, 1399, and arriving at Nagar on the following day.

Timur's descendant, the Emperor Baber, mentions four roads which lead from Kabul to India. The first, by way of Lamghanat, I have already mentioned. The second, he says, leads by Bangash; and Bangash, as we have seen, is the name of a tribe which then possessed the Kurram Valley. The third is by Naghr, the place mentioned in Timur's history, probably the Kafr-Kot; and the fourth by Fummul, in the valley of the Tochi, to the south of the Kurram. So that two out of Baber's four routes are by the Kurram Valley. There is a pass, perhaps a better one than that over the Shutar-Gardan, by the Fummul Valley, which is mentioned by Baber as leading to Kandahar. It goes from the Kurram fort and across the western Sulimanis into Zurmat, but it is unknown. In modern times the Kurram Valley was entered by a retributive expedition under General Chamberlain in 1856, when Captains Garnett and Lumsden surveyed it as far as the Paiwar Pass; and this survey was extended to Ghazni when the Lumsden Mission to Kandahar went up the Kurram Pass in 1857-58. Sirdar Muhammad Azim Khan, half-brother of the present Amir of Kabul, had a grant of the Kurram Valley, and on one occasion he carried artillery (6-pounders) over the Shutar-Gardan. They were placed on short double-humped Bokhara camels.

Waziristan.—From the southern extreme of the Kurram basin to the peak of Takht-i-Suliman is the country of Waziristan, and here the eastern Sulimani Range is more distinctly developed as a lofty chain of mountains, with several parallel ridges. In this section we have the able guidance of Colonel Walker, who explored the region in 1860; while the Great Trigonometrical Survey has accurately measured the principal peaks. Here the Sulimani Range, as seen from the Indus, appears to rise from the plains like a wall, but it is pierced at numerous points by streams, which take their rise far west, either on the slopes of the western Sulimani Mountains, or on intermediate spurs, lower than the outer range through

* Price, iv. p. 232.

† Masson, i. p. 102.

which they break before entering the plain. But the streams of the eastern Sulimani Range scarcely merit the designation of rivers; for they are but dry watercourses during the greater portion of the year. There is little moisture to feed them in their parent mountains, which are desiccated by the heat radiated from the extensive plains to the east and west. Vegetation is scarce, the soil is dry and arid, and pine-trees are not met with at a lower elevation than 9000 feet. Towering above all the other peaks of the range is the Takht-i-Suliman, opposite the town of Derah Ismail Khan on the Indus. Its summit is described as a narrow plateau about 5 miles long, stretching from north to south, with culminating points at either extremity, the northern peak being 11,300 and the southern 11,110 feet above the level of the sea. In the country of the Waziris to the north there are two other lofty peaks, the Pirghul, 11,580, and the Shah Haidar, 9000 feet above the sea.

Between the eastern Sulimani and the plains of the Derajat, bordering the Indus, there are belts of low hills composed of sandstone and conglomerate, with long narrow valleys like the Dhúns between the Siwaliks and Himálayas. These hills are inhabited by a small Pathan tribe called Batani, and Colonel Walker therefore calls the valleys between them the Batani Dhúns. But they are very unlike the Dhúns of the Himálaya. The Batani Dhúns are bare, arid, and uncultivated, for the streams from the higher hills, in passing through them, rush across abruptly in deep courses. There are no less than thirty-two passes from the plains of the Derajat into the Batani Hills, namely, the

1. Shamla, or Kurd Koh.	11. Larzan.	22. Paragbul Gad.
2. Saroba Kalan.	12. Zaneja, or Bain.	23. Kaidan.
3. Uch Saroba.	13. Gulbara.	24. Suja.
4. Sond.	14. Baz Gorah.	25. Mokiblah.
5. Kuha.	15. Sorah.	26. Tanazi.
6. Armula.	16. Khushk Kankara.	27. Khah Putr.
7. Nugram.	17. Tand Kankara.	28. Malkar.
8. Khandi.	18. Khushk Chinai.	29. Ghoraisi.
9. Karoba.	19. Tand Chinai.	30. Spin-ka.
10. Manglia.	20. Garial Gad.	31. Gasha.
	21. Pungi.	32. Tank (Zam).

The range of hills immediately west of the Batani Dhúns is composed of sandstone, in rear of which are limestone hills; and the river valleys vary in width from half a mile to a few feet, being narrowest when breaking through the axis of a ridge, and widest just before doing so, where there is usually a small oasis of cultivation. The best routes into Waziristan are through the Tank (Zam) Pass, which is practicable for artillery, and by the Khusora Pass further north; but there are many others.

The Waziris are a very large tribe divided into five great branches, namely, the Utmanzais, Ahmadzais, Mahsuds, Gurbaz, and Lali; the Kabul Khel, whose name occurs so often in border troubles, being a clan

of the Utmanzais. The whole tribe numbers 44,000 fighting men, of whom the Mahsud Waziris, who inhabit the portion of the Sulimani Mountains called Waziristan, claim 14,500. Our knowledge of their country is derived from the expedition of General Chamberlain in April and May, 1860, which was sent to punish a long series of raids and outrages. He entered by the Zam, and went out by the Khusora Pass. There are only two towns in the Waziri Mountains, Kaniguram and Makin, where iron is worked, and every village has its smelting furnace. The ore is broken to pieces and burnt in charcoal furnaces, with bellows of goat-skin. The iron runs out in rough pigs, and is worked into horse-shoes, gun-barrels, and swords. Kaniguram consists of about twelve hundred houses, built on the sides of a narrow ridge, the outer walls of the houses resting on fir poles planted vertically into the slope of the hill, with horizontal timbers thrown across. The chief roads of the town pass under these covered ways, the timbers above serving as floors for the houses. The most remarkable feature in the country of the Mahsud Waziris is the Ruzmuk Plain, which is 7 miles long by about 2 broad and 6800 feet above the sea. It has a very gentle slope southwards, in which direction its waters drain into the Zam, while on the north it terminates perpendicularly in a scarp of about 400 feet over the valley of Khissara. The expedition into the Mahsud Waziri country was not only accompanied by Colonel Walker, but also by Dr. Stewart, an eminent botanist, who has described the *flora* of this section of the Sulimanis. On the lower slopes of the Batani Hills there were tamarisk-trees, and higher up such shrubs as *Acacia modesta*, *Capparis aphylla*, and *Zizyphus jujuba*. They then came to a region of peach-trees, ferns, *Buxus sempervirens*, *Daphne oleoides*, an oak, and a bramble (*Rubus fruticosus*). At Kaniguram there were poplars and willows near the beds of streams, apricots and peaches, jasmine, and berberis. Near the brooks were *plantago*, *oxalis*, *trifolium*, *malva*, wild thyme, and several *labiate*; while tall pine forests were seen on the slopes of the Pir-Ghul. Most of the shrubs were Himálayan, and the herbaceous plants were western and European.

The Gomul Pass.—On the south of the country of the Mahsud Waziris, and just north of the Takht-i-Suliman Peak, is the Gomul River, which, with its affluents, probably drains an area of 13,000 square miles of the mountain region between the western and eastern Sulimanis. During the rains it stretches over the plains below Dera Ismail Khan, between the mountains and the Indus, to a width of 10 miles; but in ordinary weather it dries up, or is absorbed for irrigation. From the entrance of the Gomul (or Ghwalari) Pass there is a continuous ascent to the Kotal-i-Sarwandi, which is about 7500 feet above the sea, a distance of 145 miles by the road. The Ghwalari Pass is through a defile, with perpendicular walls 50 to 100 feet high, and about 200 yards wide. Beyond is the plain

where the Gomul River is joined by the Zhob, which, rising in the western Sulimanis, near the Toba Peak, to the south, has a course of 90 miles. There is a pass up the river called the Zawa, but it is entirely unknown. The Gomul route thence follows the course of the stream, crossing and recrossing many times in every mile, and there is one other easy pass before the final ascent to the crest of the western Sulimanis.

The Gomul Pass is, in several respects, the most interesting in the whole range, for it has been the great trade route between India and Central Asia during several centuries. The Povindahs, or trading tribe of Afghans, say that they are descended from a goatherd of Ghor, in the Hazarah Mountains, in the days of Mahmud of Ghazni, and they have been merchants ever since, annually passing up and down the Gomul Pass.

One *khel*, or clan, of the Povindahs, called Niazis, has settled down to agricultural pursuits in Bannu, and the Karotis inhabit the upper valley of the Gomul and the Urghun district, on the eastern slopes of the western Sulimanis, some being shepherds and fond of deer-stalking, and others carrying on the trade with Herat. The Lohani and Mian Khel Povindahs have continued the trade in the face of extraordinary difficulties for centuries. Just as they may be found now encamped on the Derajat Plain, with their Indian merchandise ready to ascend the pass, so the Emperor Baber found them during his famous raid in January, 1505. He robbed their caravan and killed their chief, and then went up by a pass south of the Takht-i-Suliman which joins the Gomul, and so by the Abistada Lake to Ghazni. But an attack upon the Povindahs in the plains was rare; their great danger is in the pass, from the Mahsud Waziris, who watch every opportunity to attack and rob them.

In the summer the Povindahs are encamped in tents on the plains near Kalat-i-Ghilzi and Ghazni, where they pay Rs. 600 a year to the Amir of Kabul for grazing rights. The women and children, with a sufficient guard, remain at the encampments, while the men are away trading at Samarkand and Bokhara, at Herat and Kabul. In the autumn they assemble to form the Indian *kafila* or caravan. The tents are stowed away in a friendly fort, and the whole tribe, men, women, and children, go down the Gomul Pass to the plain of the Indus, fighting the Waziri robbers as they go, and forming a bivouac each night round their baggage. Lieutenant Broadfoot, who went with the army of the Indus as far as Ghazni in 1839, accompanied a Povindah *kafila* down the Gomul Pass in the autumn of that year. The camels were not in strings, but driven separately, with horsemen in front and rear; while the young men, well armed, scoured the hills on either side in search of hares and deer, and as flanking parties. On arriving at a camping-ground the women help to unload, the girls draw water, the men graze the camels, and sentries are posted. The Povindahs bring down to India grapes, pears, apricots, almonds and raisins, figs and walnuts,

roses, rhubarb and jujube fruit, saffron, madder, silk, cloths, druggets, saddlery, horses, ponies, dogs, and cats. On arriving in the Derajat, near the banks of the Indus, they pitch their second set of tents, and the men go off with their merchandise to Multan, Lahore, Benares, and other parts of India.

In April the Povindahs assemble again for the return journey, taking back European and Indian goods, spices, sugar, tea, guns and pistols, and hardware. A single Englishman, Lieutenant Broadfoot, has accompanied a Povindah caravan down the Gomul Pass. One other Englishman, Mr. G. J. Vigne, joined their caravan in the Derajat, and went up with them some years previously. He found the Lohani camp on the hot plain near the Gomul, where it flows across the Derajat towards the Indus. The merchants had not yet returned, and the families were waiting for them. The boys were amusing themselves with pellet bows, bringing down the little birds with sure aim. Young girls were swinging, children splashed and dabbled in the stream, donkeys chased each other about, to the great discomfiture of tent-ropes. It was a scene of careless ease. Occasionally a string of camels or a single horseman came into camp. At last the fathers of families arrived with their merchandise, and the *kafilas* prepared to start. They set out from the encamping ground of Draband, 3 miles from the right bank of the Indus. The Povindahs went up the pass in three divisions, the first on about the 10th of April, the second on the 20th, and the third early in May. The children's hair was braided with gold coins, and the women wore massive earrings. Young brides were carried on rich cushions of silk on the backs of camels hung with tassels and ornamented with fringes and cowry shells. Older ladies were balanced against each other in baskets. The cavaliers, on handsome horses with gay trappings, pranced by the sides of their ladies. And so the great caravan moved up the pass, where there was serious work to do. On the third halt two men were murdered while asleep by Waziri robbers. Two days afterwards there was a fight in a narrow gorge, when five men were killed and two wounded. Shortly afterwards three of the rear guard fell victims; and so they fought their way up the pass. At several points on the road there are graveyards of the soldier merchants. Just before the last ascent, one division took a route to the south which led to Kandahar in ten marches. The rest went over the crest, and Mr. Vigne found himself in a country where the wild thyme and *artemisia* scented the cool air. Sand grouse and antelope afforded excellent sport, and the plains were dotted with mud forts and walled gardens of mulberries and apricots. This route leads by the Abistada Lake to Ghazni.

Besides the Gomul, the Lohanis occasionally use some passes to the south of the Takht-i-Suliman, such as the Shekh Haidar or Zarkani, which leads to Kandahar, by the Zawa (Zao) route up the Zhob Valley.

By this way there is a gorge to pass, which is a mere cleft 16 feet across, with perpendicular cliffs 500 feet high on either side.

The Povindah trade is worth upwards of fifty lakhs of rupees, and its survival in the face of such obstacles is a proof of its healthy and permanent character, and of the skill and gallantry of the merchants.

The Sanghar and Sakhi-Sawar Passes.—The Darwazi Pass is the next to the Shekh Haidar, and leads into the more important Draband Pass to the south, which has a plentiful supply of water. It leads round the north flank of the Takht-i-Suliman Peak, and, joining the Dahina Pass, is one route to Kandahar. Next to it are the Guioaba, Walia, Chaodwan, Torzoi, and Chabwi passes, merely leading to the country of the Shiranis, a Pathan tribe of inveterate marauders, numbering about 5000 fighting men. The Dahina Pass is more important, as it is a route from Chaodwan, in the Derah Ismail Khan, through the Shirani country into the Zhob Valley, and thence by the Zawa route to Kandahar. South of the Shiranis come the Ushtarani, another Afghan tribe, composed of peaceable and harmless people, but not numerous. They are separated from the Kihtrans, another small tribe, by the Kaura Pass. The Kihtrans have charge of the Wahwa Pass, and of the Barkuê, which joins it, as well as of the Liriah. The Wahwa was once frequented by merchants as a route to Kandahar. The Kihtrans are the last Afghans along the outer Sulimani Mountains, and their neighbours to the south are the Baluchis of the Kasrani tribe.

The Kasranis are met with both in the plains and among the hills, round the Bhati and Khanwah passes. In the hills there are about 450, and in the plains 1500 fighting men.

The Sanghar Pass, 30 miles south of that of Wahwa, debouches into British territory on the plains, in front of the fort of Mangrota. It is the principal entrance into the country of the Bozdars, a Baluch tribe in the outer hills, whose territory extends for about 40 by 30 miles, and is mountainous throughout. They number about 3800 fighting men. The Bozdar country is a series of bare and sterile ridges, divided by ravines, with occasional small patches of cultivation. Thus they are necessarily robbers, and, having given much trouble, an expedition was organised against them in 1857, under General Chamberlain. The troops entered by the Sanghar defile, which is bounded on either side by scarpèd hills of considerable height, and inflicted punishment upon the mountaineers, but the pass was not penetrated to any great distance. The Sanghar Pass is the most important route across the mountains between the Gomul and the Bolan. It is broad, practicable for light artillery, and is the best and most direct road from Multan to Kandahar. The Sanghar River rises in the western Sulimani Mountains, as do its principal feeders, the rivers Drug and Lundi. There is plenty of water in all parts of the pass, and forage is abundant; while the defile over the

western Sulimani Range, near the Toba Peak, is comparatively easy. Major Raverty has shown that the Sanghar Pass was used in 1653 by Prince Dara, son of the Emperor Shah Jehan, when he marched with a large army to besiege Kandahar, which city had fallen into the hands of the Persians. His army consisted of 104,000 men, and ten guns of heavy calibre, besides thirty smaller pieces. The siege guns were sent by the Bolan, while the rest of the army marched up the Sanghar Pass. Kandahar was invested from March to September, when Prince Dara was obliged to raise a siege which had lasted five months. He returned down the Sanghar Pass with an escort of a thousand cavalry, in October, 1653.

South of the Sanghar Pass there are eighteen passes into the Bozdar and Laghari country, some of which lead into the Sanghar, while others merely form routes across the outer chain. They are the

Mahuey.	Rekharn.	Ghaman.	Widor.
Shori.	Ghazi.	Sufaidu.	Dalanah.
Mati.	Satai.	Karu.	Chhoti-i-Bala.
Kaleri.	Behlab.	Sur.	Chhoti-i-Pain.
Suri.	Kahbi.	Raey.	

This section of the hills is occupied by the Khosah and Laghari Baluch tribes, the latter numbering under 4000 fighting men.

The Sakhi-Sawar Pass is occupied by the Lagharis. It is named after a village and shrine of a saint (born in 1291 A.D.), which stands on a spur jutting out into the plain, about 4 miles east of the entrance to the defile. There is a march of 13 miles to Siri, and the road then ascends in zigzags for nearly 5 miles, when a plateau is reached, which extends for another 5 miles. A descent leads thence into the Sanghar Pass; so that the Sakhi-Sawar is an important alternative route from the plains to Kandahar.

South of the Sakhi-Sawar Pass begins the country of the Gurchani Baluch tribe; where are the Kurah, Khasurah, Zangi, Suwagri, Ghati, Kaha, Khalgari, Chachar, Pitoh, Shuri, and Fajru passes. Of these the Chachar is the pass of most importance in the Southern Derajat. It was once a thoroughfare for caravans coming from the Zhob (Zawa) and Sanghar routes. But the depredations of the lawless Baluchis diverted them into less dangerous, though more circuitous routes. It is now only used by the marauders, and is practicable for horses and mountain guns.

Further south are passes called Baghari, Jahagzi, Thok, Chak, Shori, Mughal, Isfringhi, and Tahani. They all lead towards a very remarkable plateau, or, rather, series of plains divided by low hills, known as the Phylawar-Sham Plain, about 1500 feet above the sea. The word *Sham* in the Baluch language means a water-parting between two streams. The Sham Plain is high ground, within the Sulimani mountain system, dividing the drainage of the Chachar and Kaha rivers, with the Mari Hills to the east. It is 30 miles long by 25, with an area of about 900

square miles. It is abundantly watered by numerous perennial hill streams, and is everywhere clothed with rich grass, while shrubs and trees grow along the courses of the ravines; but the lawless character of the Mari and Bughti tribes, especially the former, who infest the approaches, prevents its cultivation or settlement. The gokhars, or wild asses, wild hogs, deer, and horses are the occupants of the Sham Plain.

The Mari and Bughti Baluch tribes occupy the lower hills in this section of the Sulimani Range. The Mari country is mountainous and barren, with a few fertile spots. Their chief town is Kahan, in a valley about 12 miles long, and they can muster 4000 fighting men. The Bughtis, more to the south, have a fighting force of 2200. Their chief town is called Dera. The Maris and Bughtis have given incessant trouble on the frontier by their depredations. In 1839 Major Billamore led a force into the Bughti Hills and inflicted great loss upon them, and in 1845 Sir Charles Napier conducted a campaign in the Mari and Bughti country. In 1846 the Bughtis carried off 15,000 head of cattle from the plains; but since then they have been kept in check by the Sind Horse, and one of Sir William Merewether's most brilliant feats was the defeat of a large force of Bughti marauders with a small body of Sind cavalry in 1846.

To the south of the Sham Plain are the Zangi, Sat, Naffusk, Sartaf, Jihari, and Suri passes, leading into the Mari and Bughti hills; the last-named pass encircling the Sham Plain to the south. It was one of the principal routes of the Maris in their raids into the plains. Here is the boundary between the Derajat and Upper Sind; and the mountains, followed by the course of the Indus, make a very decided bend to the westward. The receding hills give space for the large Baluch district of Kaehhi, with an area of 9000 square miles, a level region suffering from excessive heat and scarcity of water. There is an isolated ridge on the south-east side of the Sham, between that plateau and the plains, called Mount Gandhari, which forms the angle whence the outer range of Sulimani Mountains turns westward towards Dadar and the mouth of the Bolan Pass. The inner or western Sulimani Range continues to form the water-parting, and terminates at the Tukatu Peak, overlooking Kwatah, which is 12,000 feet above the sea. The Tukatu Range, north of the Bolan Pass, runs east and west, and appears to hold an analogous position at the southern extreme of the western and eastern Sulimani chains to that which, at their northern ends, is occupied by the Safid-Koh.

The western Sulimani chain of mountains, which forms the water-parting, is very little known, and has only been visited at the crests of the Kurram and Gomul passes. It probably has an elevation never less than 7000 feet, and towards the south there are some lofty peaks, namely Toba, Kand, and Tukatu. Near the Toba Peak an important offshoot

branches off to the eastward, which has several names. At first it is known as the Toba Range, and here was the sanatorium where Ahmed Shah Durani, the founder of the Afghan kingdom, died in 1773. The descriptions of the Toba district show it to be rather a lofty and broken plateau than a defined mountain range. Afterwards the spur from the western Sulimani Mountains is called Khojah Amran. It separates the basins of the rivers Argandab and Lora, extends for about 170 miles, and eventually subsides into the Baluchistan deserts. There are several passes over it, one of which called the Kohjak Pass, is on the main road from Kwatah (Quetta) to Kandahar, and was used by the army of the Indus in 1839.

The above description of the Sulimani system has been necessarily fragmentary, because there are wide gaps in our knowledge—extensive unexplored areas. I think, however, that the great features come out with sufficient distinctness. There is the main western Sulimani Range, forming a distinct water-parting between Afghanistan and India; and there are the eastern Sulimani Mountains with probably loftier peaks, but much broken, and far less clearly defined in their whole length. The intermediate space is occupied by a central chain which has been traced for a considerable distance. It branches from the Safid-Koh at the foot of the Sikaram Peak, where it is crossed by the Paiwar and Ispingwai passes. It is cut through by the Kurram River, and then continues in a southerly direction, forming the northern boundary of the Khost Valley, and of the Mahsud Waziri country. It may also be traced across the Gomul road, but our present information does not enable us to follow its direction further south. The limits of the system seem to be sharply defined by the transverse ranges of the Safid-Koh on the north and of the Tukatu on the south extremity. The numerous passes which have been enumerated vary very much in importance. Only a few form main routes from India to Afghanistan. There are but three (possibly four, including the unknown Zawa up the Zhob Valley) from the Safid-Koh to the Tukatu; namely, the Kurram, the Gomul, and Sanghar passes. A great number lead into these three from the plains, and thus form alternative routes; and several branch off from them on approaching the crest of the western Sulimanis. Many scores of passes also enter the hills from the plains of the Indus, which merely lead to the valleys occupied by hill tribes.

The Bolan Pass.—From the Tukatu Peak the Hala Mountains commence, which divide Baluchistan from Sind, and extend to the Arabian Sea. They are traversed, at their northern extremity, by the Bolan Pass, the entrance to which, in the low country of Kachhi, is in latitude $29^{\circ} 30' N.$, about 500 miles south of the Khaibar Pass. The opening is 5 miles north-west of the town of Dadar (742 feet above the sea), and the route leads in a north-westerly direction over the mountain chain, by a

succession of narrow valleys and gorges. The Bolan River, rising at Sir-i-Bolan, near the head of the pass, flows through it and supplies water along the whole route as far as its source, with the exception of one stage, where it has an underground course. The first stage of 7 miles to Khundilani is through a valley enclosed by low hills, but on the next stage of 14 miles to Kirta the pass rapidly narrows, and conglomerate cliffs, 800 feet high, close in on either side, leaving a narrow passage, through which the river flows. Kirta is a broad, level valley, 1200 feet above the sea, and surrounded by hills of nummulitic limestone. The next march of 9 miles leads to the valley of Bibi-Nani, whence a branch route goes over the hills to the left, by Rodbar, to Kalat. From Bibi-Nani to Ab-i-Gum ("lost water") is a distance of 24 miles, and it is on this stage that the river disappears. It percolates through the pebbles at Ab-i-Gum, flows underground for 14 miles, and comes out again at Bibi-Nani. Ab-i-Gum is 2600 feet above the sea. Sir-i-Bolan, the source of the river, is 6 miles beyond Ab-i-Gum, and 4400 feet above the sea. In the conglomerate hills, near this place, there are thin seams of coal.* For 10 miles beyond Sir-i-Bolan, to the top of the pass at Dasht-i-Bidaulat, there is no water. In the last 3 miles the hills on either side close in until only three or four men can ride abreast, while the limestone cliffs tower up to a great height. The gorge opens out into a narrow valley, at the end of which the path crosses the crest of a hill and enters the broad plain of Dasht-i-Bidaulat. The crest of the Bolan Pass is 5800 feet above the sea, and the total length from Dadur is 60 miles. The road leads thence to Kwatah (Quetta), 5537 feet above the sea.†

The Bolan Pass was used by Prince Dara, in 1652, for the transport of his heavy artillery when he besieged Kandahar; and Ahmed Shah Durani came down it more than once when he invaded India. The first Englishman that traversed the Bolan Pass was Mr. Masson, in 1826, and he was followed by Arthur Conolly in December, 1830, who has given a very graphic description of it. In 1839 the army of the Indus marched to Kandahar by the Bolan, the Bengal column traversing it with heavy artillery (8-inch mortars, 24-pounder howitzers, and 18-pounder guns) in six days; and the Bombay column, which followed, in about the same time. Dr. Kennedy, who was with the Bombay column, published a full account of the pass. It is infested by Mari and other robbers, who plunder the caravans, and in the season of freshes there is danger from the Bolan torrent, which rises very suddenly. In 1841 a Bengal detachment was lost, with its baggage, overtaken by a sudden flood.

The Mula Pass.—There are ten other passes, in an extent of 60 miles, leading from the plains of Kachhi to the Baluchistan highlands across the Hala Mountains, namely, the Kahun-karastah, Gazak, Makh-karastah,

* See 'R. G. S. J.,' xii. p. 110.

† Dr. Griffith's observations.

Ladau (or Muaj), Takari, Mula, Naghau, Bhore, Shadihar, and Nurmak passes. The principal route south of the Bolan is by the Mula Pass, the entrance to which is 9 miles from the town of Kotri. The road follows the Mula stream, crossing it several times, and after 12 miles enters a very narrow and tortuous defile with perpendicular masses of rock on either side. This leads to a basin in the hills, with some cultivation, and for the next 16 miles the ascent is easy up the bed of the stream. The pass then widens considerably, and leads into the Hatachi Valley, where supplies are abundant. Further on, after 16 miles up a winding stony path through tamarisk jungle, there is another tortuous defile emerging on the great open tract of Nasr, where there is a good deal of scattered cultivation, with pasture on the neighbouring hills. Hence a cross road leads to Khozdar. The main route ascends to Patki, 4250 feet above the sea, and again enters a narrow defile forming a passage 40 feet wide, and 12 miles further on is the source of the Mula River. Then the top of the pass is reached at 5250 feet above the sea. The pass is 102 miles in length, and forms a sharp angle, running south-west to Nasr, and then turning north-west to its summit, leading thence northwards up the Nal Valley to Kalat, the capital of Baluchistan.

From the southern angle of the Mula Pass the Hala Mountains run southwards to Cape Monze, a distance of 200 miles. They are called the Kirthar Hills from the Mula down to the 26th parallel, opposite Sehwan on the Indus, and thence to the sea they are locally known as the Pubh Hills, ending in Cape Monze, the western boundary of British India. The Kirthar division has peaks which attain a height of from 7000 to 8000 feet; and the table-land of Baluchistan, which the Hala Mountains support, is at Kalat 6800 feet above the sea. The hills gradually lose their elevation as they approach the sea, the Pubh Hills being only 2000 feet high; and Cape Monze itself (Ras Mowari), in latitude $24^{\circ} 50' N.$, though a prominent headland, is of moderate height. The highest part of it is 1200 feet above the sea, and Jebel Pubh, to the north, is about 2500 feet. The two heights are separated by the Hubh River, and are excellent landmarks for making Karachi during the south-west monsoon.

Authorities.—An attempt to describe an important region, and to define its main features, with very incomplete materials, is always unsatisfactory, but it serves a useful purpose. We thus take stock of our geographical materials, and this process often leads to accurate and authoritative communications from others who are more conversant with special portions of the subject. It is desirable also to record the sources of information which already exist. The Emperor Baber has handed down much valuable topographical detail.* To the persevering

* ‘Memoirs of Baber, Emperor of Hindostan,’ written by himself, translated by Leyden and Erskine, 4to., 1826.

researches of Mountstuart Elphinstone* and Lieutenant Macartney,† we owe our first detailed information respecting the mountains on the north-western frontier of British India. The spurs of the Safid-Koh and the Khaibar Pass were first described, in modern times, by Moorcroft,‡ Masson,§ and Vigne,|| and by our gold medallists, Sir A. Burnes,¶ and Lieutenant Wood,** I.X., as well as by Dr. Lord. Captain Leech,†† and by Sir H. Havelock, Colonel Dennie, Vincent Eyre, Greenwood, and other officers who served in the Afghan war. The first section of the Sulimani system from the Safid-Koh to the Takht-i-Suliman, including the Kurram Pass, has been brought to our knowledge, in the best form, by our distinguished Associate, Colonel J. T. Walker, C.B., the Superintendent of the Great Trigonometrical Survey, and now also Surveyor-General of India, in the admirable paper published in our Journal for 1862.‡‡ He himself explored Waziristan with General Chamberlain's field force, and he tells us how the Kurram Pass was surveyed in 1856 by Captains Lumsden and Garnett, and explored in 1867 by the Lumsden Mission.§§ which included Dr. Bellew.|||| and how much additional geographical information respecting this region was collected by our Associate, Colonel Johnstone, C.B., when he was Topographical Surveyor of the Derajat; ¶¶ while Dr. Stewart, of the Forest Department, reported upon the *flora* of the Waziri country.*** The Gomul Pass was traversed by Mr. Vigne,††† and afterwards by Captain Broadfoot,‡‡‡ and it is well described by the former in a small volume published in 1840. Further south, as far as the Bolan Pass, no Englishman has ever traversed the mountains from India to Afghanistan; but General Chamberlain and other officers, when punishing inroads of the wild tribes, have entered and penetrated for some distance up many of the passes. Major Raverty, whose scholarly and accurate research

* 'Account of the Kingdom of Cabul,' 4to., 1815. 'Account of Cabul,' 2 vols. 8vo., 1839.

† The map in Elphinstone's work, by Macartney, is a monument of the industry and sagacity of its compiler.

‡ 'Travels in the Himalayan Provinces of Hindostan,' 2 vols. 8vo., 1841.

§ 'Narrative of Journeys in Belochistan, Afghauistan,' &c., 4 vols. 8vo., 1842-43.

|| 'Personal Narrative of a Visit to Cabul,' &c., 8vo., 1840.

¶ 'Cabool in 1836-38,' 8vo., 1842.

** 'Journey to the Source of the Oxus,' 8vo., 1841; 2nd edition, with Introduction by Colonel Yule, 1872.

†† 'Reports by Burnes, Lord, and Wood. Political, Geographical, and Commercial, in Scinde and Afghanistan,' maps, 4to., Calcutta, 1839.

†† 'On the Highland Region adjacent to the Trans-Indus Frontier of India,' 'R. G. S. J.,' xxxii. p. 303.

§§ Official Reports.

|||| Ibid. And 'Journal of a Political Mission to Afghanistan in 1857,' 8vo., 1862.

¶¶ Official Reports, condensed in the Annual Reports on the Topographical Surveys of India.

*** 'R. G. S. J.,' 1862, vol. xxxii. p. 316.

††† 'Personal Narrative of a Visit to Cabul,' 8vo., 1840.

‡‡‡ Official Report.

places him in the foremost rank as an authority, has a profound knowledge of this region; and there must be many unpublished reports of frontier officers containing invaluable geographical information. At the Bolan Pass we come again to well-trodden ground. It was described years ago by Masson* and Conolly,† and by Dr. Kennedy, Major Hough,‡ and others who accompanied the army of the Indus in 1839. More recently it has been carefully examined by Dr. H. Cook, of the Kalat Mission.

Further south, the Mula Pass has been explored by Dr. Bellew, and details respecting the Hala Mountains have been published by our Associate, Mr. A. W. Hughes, in his work on Balochistan.§ It is well known that a vast mass of information on the North-West Frontier has been brought together, after the untiring work of years, and most ably condensed and systematised by our Associate Colonel MacGregor. We heard this from himself in 1876;|| but his valuable labours are still obscured in the mists of official secrecy. Geographers also owe a great deal to another Fellow of this Society, Major-General Thuillier, C.S.I., the late Surveyor-General of India, for the publication of maps, such as those of the district of Derah Ghazi Khan (1856–59), of Bannu and Derah Ismail Khan (1856–61), and others, where not only are the physical features of the country accurately delineated, but most valuable geographical notes by the surveyors are often added. The new map of Afghanistan, by our Associate Major Wilson, which was undertaken for the India Office, at the suggestion of the Geographical Department, embodies, on a large scale, all the information that could be collected together up to the present time, and represents a vast amount of research and careful study.

* Ubi sup.

† 'Journey to North of India, overland from England,' 2 vols. 8vo., 1838.

‡ 'Narrative of Campaign of the Army of the Indus,' 2 vols. 8vo., 1840, by Dr. Kennedy. 'Diary of a March through Sindh and Afghanistan,' by Rev. J. N. Allen, 8vo., 1843. 'Narrative of March of Army of Indus,' by Major W. Hough, 8vo., 1841. See also a paper on the Bolan Pass in the 'R. G. S. J.,' xii. p. 109. That eminent botanist, Dr. William Griffith, was also with the army of the Indus, and made a series of hypsometrical observations. See 'J. A. S. B.' (new series), No. xxxvii. pp. 54, 55. His journals were published in 1847–54 (5 vols.).

§ 'The Country of Balochistan,' by A. W. Hughes, 8vo., 1877.

|| See 'Proceedings R. G. S.,' Feb. 28, 1876. See also, for a list of Colonel MacGregor's works, the second edition of my 'Memoir on the Indian Surveys,' pp. 351 and 352 (note).

In his speech at our meeting, Colonel MacGregor dwelt upon our lamentable ignorance of Afghan geography. He said that the country of the Afridis, the Zaimukht, the Bangash, the Turis, of Khost, of Dawar, of the Zhob Valley, were almost to us sealed books. He added that he had made a list of seventeen important military routes from Afghanistan to our frontier, of which we have not sufficient information to enable our Government to form a sound opinion respecting their merits. He added that, in an advance on Kandahar, we should probably use the Bolan Pass, but only because we do not know any other sufficiently well.—'Proceedings R. G. S.,' vol. xx. pp. 248, 249.

GEOGRAPHICAL NOTES.

Keith Johnston's East African Expedition.—Mr. Keith Johnston and his assistant, Mr. Joseph Thomson, left England for Zanzibar by the steamer *Assyria* on the 14th of November. As already announced, the Expedition has for its chief object the exploration of a direct line of route between the harbour of Dar-es-Salaam, on the East African coast, a few miles south of Zanzibar, and the northern end of Lake Nyassa; its cost being defrayed by the African Exploration Fund, raised by public subscription and administered by a Committee of Council of the Royal Geographical Society, which latter has already contributed 1000*l.* to the Fund. On their arrival at Zanzibar, Mr. Johnston and his companion will spend some weeks there, and in excursions to the neighbouring mainland, making preliminary investigations, and acquiring experience to serve them in their long journey inland. In finally preparing his Expedition for the interior, Mr. Johnston will be guided by the advice of Dr. Kirk. Since the diminution of the slave traffic at Kilwa, a great change is said to have taken place in the disposition towards strangers of chiefs and peoples in the interior westward of that place, through which part of the route of the Expedition will lie, and it is hoped that no obstacles such as drove back Baron van der Decken in 1860 will now be encountered. Should Mr. Johnston reach Nyassa with unexhausted resources, he will push on for the southern end of Lake Tanganyika, where by that time it is expected the London Missionary Society will have planted a station; his return route eastward is to be as near to the course of the River Rufigi as possible. Appended is an extract from Mr. Johnston's instructions:—

“The object of the Expedition is to examine the nature of the country between the places above mentioned, to gather data for constructing as complete a map as possible of the route, and to make all practicable observations in meteorology, geology, natural history, and ethnology, with a view to rendering as exact as circumstances permit the information obtained regarding the region, its inhabitants, and products. As special subjects of investigation, it is expected that you will observe and note the routes best adapted for future more extensive communication, and that you will spare no efforts in examining the range of mountains seen by Mr. E. D. Young, and Captain Elton and his party, at the north-eastern end of Lake Nyassa: ascertaining their extent and elevation, and the condition of the routes or passes over them. The practicability of constructing and maintaining a line of telegraph from north to south through the region is also a subject which the Committee wish you to inquire into. If you succeed in reaching Lake Tanganyika, your special attention should be directed to facts bearing upon the extraordinary rise in the level of the lake in very recent times, as stated by Mr. Stanley. The evidences of such a pheno-

menon would be readily obtainable on the shores of the lake; and besides making accurate measurements, you will do well to institute inquiries as to whether the rise may not be periodical, or the result of a succession of years of excessive rainfall. In the event of its proving continuous, you should investigate with care the causes and results of so remarkable a phenomenon."

The instrumental outfit of the Expedition has been provided by the Society. The Government, as on former similar occasions, have furnished arms, &c., for the native escort; and Admiral J. W. D. McDonald has supplied one of his newly invented "folding boats," for the navigation of rivers and lakes.

Survey Arrangements of the Afghanistan Expedition.—Captain M. W. Rogers, R.E., accompanies the Quetta (Kwatah) expeditionary column as Surveyor. He has previously for some years been engaged in triangulating in the deserts of Eastern Sind. We learn that he has already fixed a number of mountain peaks in the neighbourhood of Quetta and Khalat, and he will probably extend his triangulation northward, so as to join his work with that of the Kurram and Khaibar columns. Among many urgent pieces of topographical survey work needed in this direction may be mentioned the exploration of some better route to Quetta than the one from Rajanpur viâ Bandaula, Dehra, Lelri, and the Bolan, which proved especially harassing to the troops, followers, artillery, and cattle of General Biddulph's force. Lieutenant Barton is said to be surveying a route from Kashmor viâ Shahpur, but the one which especially requires surveying is the direct route to Kandahar viâ the Sanghar Pass, along which Prince Dara Shukoh took his immense army against Kandahar in 1653, as related by Major Raverty.—With the Khaibar column are Major Tanner, Captain Samuells, and Mr. Scott, all surveyors of experience, who are fixing points on the ranges encompassing the route, so as to combine this work with other points fixed in previous times, and so supply a correct basis for the construction of a topographical map extending, it is hoped, as far as, if not beyond, Kabul. It is not improbable, too, if opportunity offer, that these surveyors may proceed to map out the almost unknown regions of Kafiristan and adjoining parts.—Captain R. G. Woodthorpe, lately returned from Assam, is said to be accompanying the Kurram column; and we learn from a private letter from himself that Major O. B. St. John, R.E., is deputed to Quetta, where he will no doubt be able to add greatly to our geographical knowledge of the country.

Russian Expedition to Hissar, Karateghin, and the Pamir.—In July last a Russian expedition of a scientific character left Samarkand, to explore the little-known mountainous region of Hissar and Karateghin from west to east. It consisted of M. Oshanin, M. Nevelski, a botanist, and M. Rodionof, a surveyor. The party travelled to Yakobagh, and thence ascended the Kyzyl-su to Tash-kurgan. The road lies at

first through a thickly populated valley, and thence leads through a mountainous and difficult country. There proved to be no direct route from Tash-kurgan to Karatagh, on the Surkhan, and the party found that they would have to travel via Sary-jui. After crossing the Sagari-Marda Pass (11,000 to 12,000 feet), which is one of great difficulty, the descent being especially hard, the Russians reached the village of Sarym-Saglyk. The road is described as trying, and the path as being frequently so narrow that the loads had to be taken off the backs of the animals and carried by hand. Nowhere among the Turkestan mountains had M. Oshanin seen such forests as here line the roadway, and the maple, hawthorn, honeysuckle, pear-tree, and a certain kind of ash were not unfrequently met with. Beyond Sarym-Saglyk a peculiar species of wild vine, different from that reared by cultivation, was found to abound, and to be used as an article of food. Before reaching Sang-gardak the road appears to have been almost impassable. The track is described as passing over a series of ledges frightfully narrow, rough, and steep, and the Sang-gardak River had to be forded twelve times. Sary-jui was reached on the 19th August, and here the party entered a region already explored by M. Maief in 1875. The country appeared to be denuded of troops, these having been all despatched to Darwaz. From Sary-jui the Russian party followed pretty nearly the regular route by way of Regar, Karatagh, Hissar, Dushambe, Kafirnihan, as far as Faizabad, but at the latter point they ascended the Ilek-Daria, an affluent of the Kafirnihan, and entered upon new ground. The Ilek-Daria runs in a south-westerly direction, and was followed by M. Oshanin to its source, which is separated from the source of the Ab-i-gharm (flowing south-east into the Surkhan) by an imperceptible water-parting. Thence the road runs more or less closely along the course of the Surkhan, and though difficult, is not dangerous. The first bridge occurs at Saripul village, just below Gharm, while below that point communication is kept up by means of crossing on inflated skins. The population is tolerably dense, and the people occupy themselves with the growth of wheat, barley, flax, millet, and lucerne, the last two being irrigated crops. Corn is abundant, and is exported to Macha and Darwaz, at which latter place it is exchanged for cotton and iron. Darwaz has been (apparently for some months) the scene of a revolt, owing, it is said, to the arrest of the ruler of Karateghin, who was nearly related to the ruler of Darwaz. The latter has, however, since been captured and sent to Bokhara, and tranquillity has been now re-established in Darwaz.—Some information about Darwaz was collected. The Khulias River, described as a very large stream, proved to join the Surkhan on the left, 45 versts below Gharm. It is called Vakhia in its upper course, and the whole of its valley excepting the lowest portion belongs to Darwaz. In the meridian of Gharm the mountain range separating the Surkhan from the Khulias, attains in one of its peaks an altitude of 15,000 feet.—Gharm was left

on the 7th September. Having ascertained that the road along the Muk-su was impracticable for pack animals, the party determined to proceed along the known route to Great Karamukh, and thence across the Tirs-agar Pass and the head-waters of the Muk-su, to the Pamir, by way of the Takhta-Kuram Pass. M. Oshanin's last letter was dated 13th September, from Jailgan, a place 20 versts distant from Little Karamukh. He states that the Muk-su River flows between two lofty snow-covered ranges, of which the northern one forms the western extremity of the Trans-Alai Range, and the southern one, a continuation of the range, skirting the left bank of the Surkhan referred to above. Its highest peaks are near the mouth of the Muk-su, and average 18,000 feet, while one peak is at least 22,000 feet high.—M. Oshanin hoped to send his next letter from Sarikul or Darkot, if he could find any man plucky enough to accompany him across the dread Pamir plateau.—The party made botanical and zoological collections, and acquired important topographical and other information, besides executing a survey along their entire route.

Maief's recent Journey to Southern Bokhara.—The 'Turkestanskiya Vedomosti' gives the following particulars of M. N. A. Maief's recent journey:—"N. A. Maief returned to Tashkend on the 30th August from his second * expedition to the mountainous country of Southern Bokhara. His journey lasted twenty days (from the 9th to the 29th August). As far as Karshi † he accompanied the members of the embassy sent by the Governor-General to the Amir of Bokhara; thence he turned into the mountains viâ Khuzar. During this expedition M. Maief explored the direct road through the mountains from Tenga-Khoram camping-ground to the large and flourishing kishlak (village) of Kuitan over the Ak-bash Pass, and through the valley of the Kerchak-daria. This is a good-sized mountain stream, and had never been heard of before Maief's visit, and the same may be said of another stream, the Kuitan-daria. M. Maief then took the important road from Kuitan to Shirabad over the mountains through the Tenga-daval Pass. This defile intersects the whole mountainous mass of the Kuitan-tau (the south-westernmost of the Hissar chains). Across another lofty chain, the Pash-khurd, the road follows the Hodja-Ulkan ravine. From Shirabad, Maief turned towards the ferry across the Surkhan at the kishlak of Kakaita, and marched hence through the whole valley of the Surkhan as far as Regar and Sary-jui. In order to vary the journey in returning, Maief took the road to Shaar traversed by Oshanin in the same month. This is a very difficult road; from Sary-jui it passes through the kishlaks of Sengri-tagh, Bakcha, and Tash-kurgan to Yakobagh. It is not considered practicable for pack animals, and is for the most part

* His first expedition was in the summer of 1875.

† Karshi is the seat of the Manghit, the ruling Bokharian tribe, and is the residence of the heir apparent to the throne of Bokhara.

supported on ledges of rock, now and then barely six inches wide, overhanging the boisterous torrent of the Sengri-tagh-daria. At Shaar Maief took leave of the Amir of Bokhara, thanking him for the assistance rendered by his officials. In this way much has been done this year to fill in and correct the cartography of Central Asia, and the mountains of Bokhara are gradually becoming better known."

New Guinea: Rev. J. Chalmers' Explorations.—The Rev. J. Chalmers, who founded a station of the London Missionary Society at South Cape about a year ago, has recently performed a journey in the south-eastern part of New Guinea, in company with Mr. Chester, the magistrate of Thursday Island, in the course of which much previously unexplored country was traversed, and our knowledge of the much-indented coastline greatly increased. We are indebted to the 'Colonies and India' for the information that eighteen populous villages were discovered, and the natives, though kind and docile, were formal and superstitious. Besides seven rivers and numerous rivulets, three mountains and extensive bays and lakes were seen. The country was splendidly supplied with water, and the land was very rich. We may expect full and authentic details of Mr. Chalmers' explorations in a paper promised by Dr. Mullens, during the present Session.

Recent Survey of the Amazons by the Americans.—The 'New York Herald' of October 23rd contains a brief account of the survey of the River Amazons just completed by Commander Selfridge, U.S. Navy, the well-known explorer of the routes for an interoceanic canal across Darien and Panama. The chief object of the survey was to obtain an accurate hydrographical knowledge of the lower course of the great affluent, the Madeira, which had been long urged on the United States Government by Colonel G. E. Church; but in addition to this, the expedition has supplied a track survey of the Lower Amazons as far as the mouth of the Madeira. Appended to the newspaper account above cited is a list of the observations for fixing positions, which are most complete, and worthy of the Government by whose officers they were taken. It would appear, however, that the writer of the notice was not aware that a previous survey, extending over several years, had been carried out by the Brazilian Government under the direction of Captain José da Costa Azevedo, the first results of which, under the title of 'Primeiros Traças Geraes da Carta particular do Rio Amazonas,' were published in the form of a large atlas of the river about ten years ago. An efficient track survey of the Lower Amazons as far as Obydos was made long prior even to this, in 1846, by Lieutenant de Montravel, of the French Navy, whose charts are well known to geographers and navigators. As far as the main river is concerned, the charts of the Brazilian atlas are complete, from the Atlantic to the Brazilian frontier, a distance of 1800 miles: they are on the scale of half a centimetre to the geographical

mile, or one-sixteenth of the original drawings. The river is represented in width and depth as it is in mid-season, or at the mean height of its water, and the soundings are in palms of ten to a fathom. The originality of the recent American survey applies then only to the Lower Madeira, of which, according to Commander Selfridge, "an excellent chart has been made from its mouth to the first falls (St. Antonio), with soundings at every few hundred feet; the survey demonstrating that the river can be navigated by steamers of not more than 18 feet draught as late as the middle of July. The total length from the mouth to the falls was found to be 578 miles." The full report of the survey will be soon published, and this will probably explain the strange discrepancy as compared with previous authorities in the longitude given of the city of Pará: the list above mentioned stating the figures at $48^{\circ} 59' 15''$ W., whilst the mean of all former observations, English, French, and Brazilian, is $48^{\circ} 28' 17''$. The whole survey only occupied three months, from June 3rd to September 3rd.

The Climate of the Polar Regions in former Ages, and North Polar Origin of the Floras of the Globe.—The Presidential Address of Sir J. D. Hooker to the Royal Society on the 30th November last, contains the following passages bearing on a question of the highest importance in physical geography:—

"In his 'Epoques de la Nature' Buffon argues that the cooling of the globe, having been a gradual process, the polar regions must have been the first in which the heat was sufficiently moderate for life to have appeared upon it; that other regions being as yet too hot to give origin to organised beings, a long period must have elapsed, during which the northern regions, being no longer incandescent, as they and all others originally were, must have had the same temperature as the most tropical regions now possess.

"Starting from this thesis, Count Saporta * proceeds to assume that the termination of the Azoiæ period coincided with a cooling of the water to the point at which the coagulation of albumen does not take place; and that then organic life appeared, not in contact with the atmosphere, but in the water itself. Not only does he regard life as originating, if not at the North Pole, at least near to it, but he holds that for a long period life was active and reproductive only there. In evidence of this he cites various geological facts, as that the older, and at the same time the richest, fossiliferous beds are found in the cool latitudes of the North, namely, in lats. 50° to 60° , and beyond them. . . . He adds that M. d'Archiac has long ago remarked that, though so continuous to the northward, coal-beds become exceptional to the southward of 35° N. Hence Count Saporta concludes that the climatic conditions favourable to the formation of coal were not everywhere prevalent on the globe, for that while the southern limit of this formation may be approximately drawn, its northern must have extended to the Pole itself.

"I pass over Saporta's speculations regarding the initial conditions of terrestrial life, which followed upon the emergence of the earlier stratified rocks from the Polar Ocean, and proceed to his discussion of the climate of the carboniferous epoch as

* Comte Gaston de Saporta, "L'Ancienne Végétation Polaire," in *Compte Rendu of the International Congress of Geography*, held in Paris, 1875 (published 1877).

indicated by the characters of its vegetation, and of the conditions under which alone he conceives this can have flourished in latitudes now continuously deprived of solar light throughout many months of the year. In the first place, he accepts Heer's conclusions (founded on the presence of a tree-fern in the coal measures specifically similar to an existing tropical one), that the climate was warm, moist, and equable, and continuously so over the whole globe, without distinction of latitude. This leads him to ask whether, when the polar regions were inhabited by the same species as Europe itself, they could have been exposed to conditions which turned their summers into a day of many months' duration, and their winters into a night of proportional length?

"A temperature so equable throughout the year as to favour a rich growth of Cryptogamic plants, appears, he says, to be at first sight incompatible with such alternating conditions (as a winter of one long night and a summer of one long day); but equability, even in high latitudes, may be produced by the effect of fogs due to southerly warm oceanic currents, such as bathe the Orkneys and even Bear Island (in lat. 75° N.), and render their summers cool and winters mild. To the direct effects of these he would add the action of such fogs in preventing terrestrial radiation, and hence the cold this produces; and he would further efface the existing conditions of a long winter darkness by the hypothesis that the solar light was not, during the formation of the coal, distributed over the globe as it now is, but was far more diffusive, the solar body not having yet arrived at its present state of condensation.

"That the polar area was the centre of origination for the successive phases of vegetation that have appeared on the globe is evidenced, under Count Saporta's view, by the fact that all formations, Carboniferous, Jurassic, Cretaceous, and Tertiary, are alike abundantly represented in the rocks of that area, and that, in each case, their constituents closely resemble that of much lower latitudes. The first indications of the climate cooling in these regions is afforded by *Coniferae*, which appear in the polar Lower Cretaceous formations. These are followed by the first appearance of Dicotyledons with deciduous leaves, which again marks the period when the summer and winter season first became strongly contrasted. The introduction of these (deciduous-leaved trees) he regards as the greatest revolution in vegetation that the world has seen; and he conceives that once evolved they increased, both in multiplicity and in diversity of form, with great rapidity, and not in one spot only, and continued to do so down to the present time.

"Lastly, the advent of the Miocene period, in the polar area, was accompanied by the production of a profusion of genera, the majority of which have existing representatives which must now be sought in a latitude 40° further south, and to which they were driven by the advent and advance of the glacial cold; and here Count Saporta's conclusions accord with those of Professor A. Gray, who first showed, now twenty years ago, that the representatives of the elements of the United States Flora previously inhabited high northern latitudes, from which they were driven south during the Glacial period.

"Perhaps the most novel idea in Count Saporta's Essay is that of the diffused sunlight which (with a densely clouded atmosphere) the author assumes to have been operative in reducing the contrast between the polar summers and winters. If it be accepted it at once disposes of the difficulty of admitting that evergreen trees survived a long polar winter of total darkness, and summer of constant stimulation by bright sunlight; and if, further, it is admitted that it is to internal heat we may ascribe the tropical aspect of the former vegetation of the polar region, then there is no necessity for assuming that the solar system at those periods was in a warmer area of stellar space, or that the position of the Poles was altered, to account for the high temperature of Pre-Glacial times in high northern latitudes; or, lastly, that the main

features of the great continents and oceans were very different in early geological times from what they now are.

"Before Count Saporta's Essay had reached this country another continuation of the subject of the origin of existing Floras had been communicated to our own Geographical Society, by Mr. Thiselton Dyer, in a lecture on 'Plant Distribution as a field for Geographical Research.' Mr. Thiselton Dyer's order of procedure is the reverse of Count Saporta's, and his method entirely different. He first gives a very clear outline of the distribution of the principal existing Floras of the continents and islands of the globe, their composition, and their relations to one another, and to those of previous geological epochs. He then discusses the views of botanists respecting their origin and distinctive characters, and availing himself of such of their hypotheses as he thinks tenable, correlates these with those of palæontologists, and arrives at the conclusion 'That the northern hemisphere has always played the most important part in the evolution and distribution of new vegetable types, or, in other words, that a greater number of plants has migrated from north to south than in the reversed direction, and that all the great assemblages of plants which we call Floras, seem to admit of being traced back at some time in their history to the northern hemisphere.' This amount of accordance between the results of naturalists working wholly independently, from entirely different stand-points, and employing almost opposite methods, cannot but be considered as very satisfactory."

Obituary.

Admiral Sir George Back, D.C.L., F.R.S.—Since the date of the Obituary Notices given in the last Presidential Address, the Society has lost by death several of its most eminent members, whose careers it is necessary briefly to review, as space and opportunities permit. First on the melancholy list stands the name of our much-honoured Associate, Admiral Sir George Back, who died just before the close of our Session, on the 23rd of June.

Sir George Back was born at Stockport in November, 1796, and entered the Navy at the early age of twelve. His career as an Arctic explorer, in which he achieved undying fame, commenced in 1818, when he served as mate under Lieutenant (afterwards Sir John) Franklin, commander of the *Trent*, companion vessel to the *Dorothea*, under Captain Buchan, in the expedition despatched by the Government to discover a passage by way of Spitzbergen and the North Pole to Behring Strait. After a fearful struggle with heavy flocs amid stormy seas along the border of the ice-field up to 80° 34', the Expedition returned home unsuccessful. Soon afterwards, 1819–1822, he was associated with Franklin in the perilous land journey down the Coppermine River and along the coast of Arctic America, in which he served as surveyor and draughtsman. The dangers and sufferings of this expedition were described afterwards by the zealous and devoted young officer in thrilling language. For two years the whole expedition was in danger of starvation, and the ultimate salvation of the party was due to Back, who made a long and terrible winter journey by land to bring succour to his chief. A brief interval, passed in ordinary naval duties, as Lieutenant in the *Superb*, in the West Indies and at Lisbon, intervened between this his first great Arctic land expedition and the second, 1825 to 1827, in which he again served with Franklin in Arctic America, making a survey of the shores for two-thirds of the distance to Behring Strait. During this second journey he again distinguished himself by his courage and judgment, in saving his party during an attempt made by some 200 Esquimaux to pillage the boats at the mouth of the Mackenzie River.

By this second land journey his health was much shaken, and he did not appear

again as an Arctic explorer till 1833, when he volunteered to take the command of an expedition in search of Sir John Ross, who had been absent four years. His journey on this occasion lasted two winters, and during the time he discovered the Great Fish, or Back, River. The narrative of the expedition, which he published in 1836, beautifully illustrated by engravings from his own drawings, greatly added to his reputation, establishing his position as a man of literary and artistic tastes and accomplishments as well as a brave and enterprising officer. On his return he was much feted, and received the rare distinction of a Post Captaincy by Order in Council.

In 1836, at the instance of the Royal Geographical Society, the Government despatched an expedition to Wager River, the command of which was entrusted to Captain Back, in the *Terror*. It was during this voyage that the memorable incident occurred of the *Terror* being broken and thrown on the surface of the ice, after being compelled to winter in the moving pack, an incident which has become classic in the annals of Arctic adventure.

With this voyage his active career in Arctic enterprise was brought to a close; but he never lost his interest in the subject, and was looked up to until the close of his long life, as a guide and authority by all the new generation of navigators and explorers. His advice and support as a member of the Arctic Committee formed an important element in the success of the movement in our Society which led to the Arctic Expedition of 1875-6; and he presided, a genial veteran of eighty years, over the meeting of old Arctic officers on the 6th of December, 1876, gathered together to welcome the officers of the *Alert* and *Discovery* on their return.

Sir George Back was closely connected with the Royal Geographical Society almost from the commencement. He received the Royal Medal in 1835, and joined the Society as Fellow in 1836. For many years he served as Member of Council—seven years as Vice-President—and he occasionally presided at our evening meetings. The regard which he entertained for the Society and its objects was testified at the last by his bequest of the fine portrait of himself by Brockedon, and of the legacy of 600*l.*, the annual interest of which is to be applied to the rewarding of meritorious explorers.

REPORT OF THE EVENING MEETINGS, SESSION 1878-9.

First Meeting, 11th November, 1878:—Sir RUTHERFORD ALCOCK, K.C.B.,
Vice-President, in the Chair.

PRESENTATION.—*Robert Stewart, Esq.*

ELECTIONS.—*Rev. Chas. Laurford Acland; Sir Sanford Freeling, K.C.M.G.* (Governor of the Gold Coast Colony); *Anthony O'Grady Lefroy, Esq., C.M.G.* (Colonial Treasurer, W. Australia); *William Scott, Esq.; George Smith, Esq., LL.D.; Joseph Henry Ward, Esq.*

On opening the proceedings of the Meeting, the CHAIRMAN said he was sure the Society would be much disappointed, as he and his colleagues on the Council were, to learn that it had been found impossible for the Earl of Dufferin to take his seat as President on this occasion. He had received a letter from him a few days ago, in which he expressed his regret at not being able to be present, owing to his having received her Majesty's commands to attend at Balmoral on the 9th. He had, at the same time, asked him (Sir Rutherford) to supply his place, announcing the cause of his absence, and doing the best he could, at so short a notice, to give the usual address.

The opening Address by Sir Rutherford Alcock was then read (*ante*, p. 1).

The CHAIRMAN then introduced the subject of the evening, which was a paper by

Signor D'Albertis, the well-known Italian naturalist, on his extensive explorations in New Guinea. Signor D'Albertis was present, but feeling some diffidence as to his mastery of the English language, he had asked that his paper might be read by the Secretary.

Mr. C. R. MARKHAM, Secretary, then read Signor D'Albertis' paper, entitled "Journeys up the Fly River, and in other parts of New Guinea" (*ante*, p. 4, with Discussion).

The Rev. Dr. MULLENS communicated to the Meeting some recent news he had received from the party sent by the London Missionary Society to Lake Tanganyika. He said he held in his hand a letter he had received that morning, which left Ujiji only seventy-eight days ago. It was written by Mr. J. B. Thomson, the head of one of the divisions of the Missionary Expedition. The party had suffered much through the loss of their oxen and from hard toil during the first 200 miles from Zanzibar; but it seemed as if all their trouble had been concentrated in that first stage. The second and third stages had been passed with wonderful celerity. From Mirambo's Town to Ujiji only occupied eighteen days, and cost only fifty-six cloths and forty-four yards of calico. Mr. Thomson stated that the party were all well. The letter was brought down to the coast by natives, who caught the steamer, and it was at once brought to England. If such a happy state of things had existed eight years ago, Dr. Livingstone would never have been lost. He was sure all the Fellows of the Society would regard the change with great satisfaction.

Mr. FRANCIS GALTON called the attention of the Meeting to the presence of Mr. Keith Johnston, the leader of the new African Expedition, who would leave England for Zanzibar in the course of the week. He was sure the Society would be glad to hear a few words from him.

The CHAIRMAN added that they would all naturally wish Mr. Keith Johnston God-speed in his arduous undertaking. They had full confidence that with God's help he would not fail to bring home good fruit.

Mr. KEITH JOHNSTON, responding to the call, rose and thanked the Meeting for the expression of its good wishes. He thought it would be out of place, before he had commenced his work, to say much of what he intended to do, but he hoped to have a good deal to tell the Society when he returned.

*Second Meeting, 25th November, 1878:—*Major-General Sir H. C. RAWLINSON, K.C.B., Vice-President, in the Chair.

ELECTIONS:—*Edward Lyall Brandreth, Esq.; Frederick Burt, Esq.; James Bussell, Esq., B.A.; Ralph Abercrombie Cameron, Esq.; Capt. Edmund John Church, R.N.; William Collins, Esq. (Lord Provost of Glasgow); Sir John Coode, Knt., C.E.; John Richard Deane, Esq.; James Dixon, Esq., Jun.; Thomas Wyard Drutt, Esq.; Philip Ellis, Esq.; Rev. J. P. Furler; Rev. A. Hamilton Gell; Sir Charles Harvey, Bart.; Lieut. James Llewellyn Heane, R.N.; Daniel Hickie, Esq.; Samuel Thomas Hill, Esq.; George Johnston, Esq., M.D.; John James Jones, Esq.; Capt. A. Abercrombie Jopp, R.E.; Robert Batson Joyner, Esq.; George Kilgour, Esq.; Thomas Kilham, Esq.; Rev. Frederick Charles Lambert, B.A.; John L'Aker, Esq.; Charles Harper Lepper, Esq.; Alfred Lloyd, Esq., B.A.; Lieut.-Gen. Sir Daniel Lyons, K.C.B.; John Vine Milne, Esq., B.A.; Leopold McKenna, Esq.; A. H. Hallam Murray, Esq., B.A.; Commander G. C. Musters, R.N. (H.M. Consul, Mozambique); Percy Nightingale, Esq.; Colonel J. T. Norgate; John Norris, Esq.; Rev. Charles Perry; John Poland, Esq.; Rev. William Potter; Frederick Powell, Esq.; Capt. Charles E. Pryce; James Robinson, Esq., M.A.; Vincent Joseph Robinson, Esq.; Alfred G. Schiff, Esq.; Major-Gen. Edward W. Scott (late Bengal Artillery);*

Alfred Simson, Esq.; Collard Joseph Stock, Esq.; Rev. Charles Parbutt Taylor; E. S. Thomasson, Esq.; Lieut. W. H. Turton, R.E.

A paper was read, "On the Usambara Country in East Africa," by the Rev. J. P. Farler (will be published in the February number).

Third Meeting, 9th December, 1878:—The Right Honourable the Earl of DUFFERIN, K.P., President, in the Chair.

PRESENTATION.—*R. A. Cameron, Esq.*

ELECTIONS.—Hon. Corresponding Member, *Monsieur Alfred Rabaud* (President of the Geographical Society of Marseilles). Fellows:—*John Francis Arnold, Esq.; William Bose, Esq.; Lieut.-Colonel Henry Thomas Butler; Capt. George C. Childs; Wm. Dawson, Esq.; Capt. A. William Jamieson* (Beng. Staff Corps); *James Kendall, Esq.; Edwin Pierce, Esq.; Sir Norman W. D. Pringle, Bart.; Thomas Taylor, Esq.; Robert G. D. Tosswill, Esq.*

On this, his first occasion of taking the Chair since his election, the PRESIDENT addressed the Meeting as follows:—

Ladies and Gentlemen,—I am sure there is no member of the Geographical Society present here to-night who will think it unnatural that before proceeding to the regular business of the evening, I should take this, the first opportunity which has been presented to me, of expressing to the Society generally my deep sense of the honour which has been conferred upon me by my recent election to the presidential chair. Absent as I was in a distant country, I was quite unprepared for such a proof of your confidence and goodwill; and, indeed, when I reflect how few and scanty are my claims to such a distinction,—when I remember the peculiar qualifications possessed by my immediate predecessors, by Sir Roderick Murchison, by Sir Bartle Frere, by Sir Henry Rawlinson, and by Sir Rutherford Alcock,—I am sensibly oppressed by the weight of my responsibility, and I feel very deep and sincere misgivings as to whether I may not fall short of your just expectations and of the requirements of my office. At all events, I desire at once, and beforehand, to ask you on all occasions to extend to me your kind patience and indulgence. Happily, I know that on occasions of difficulty I can always fall back upon the assistance and advice of some of the most eminent men in England, who are also distinguished geographers, and who, by their experience, will enable me to meet every difficulty, and guide me in every uncertainty. But although I am forced in common honesty to make these admissions, and to acknowledge that in many ways I certainly fall short of my distinguished predecessors, and although I have no claim whatever to be regarded as a scientific geographer, at all events there is one respect in which I can conscientiously consider myself the equal of any of those who have preceded me, and that is in a sincere and enthusiastic desire to promote geographical research, in a profound conviction of the utility of the functions discharged by this Society, and in a respectful and affectionate sympathy with those brave and gallant men who year by year are sent forth under our auspices to encounter exile, danger, and privation, in order that they may explore the hidden pathways of the world, that they may enlarge the borders of man's inheritance, that they may bring to the knowledge of the human race those treasures which nature has garnered in her undiscovered storehouses for the use, the benefit, and the happiness of future generations.

The following Papers were then read by Mr. Markham:—1. The Swedish Arctic Expedition; 2. The Dutch Expedition of 1878; 3. The Route for Future Polar Discovery (*ante*, p. 16, with Discussion).

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—December 4th, 1878: M. DE QUATREFAGES in the Chair.—A communication on the subject of emigration, by M. de Bassano, was read. The object of the writer was to lay before the Society the preliminary programme of an international association having for its aim the promotion of emigration, by the collection and publication of authentic accounts of countries suitable for colonisation, and otherwise assisting intending emigrants. The association to be called the *Conseil d'Emigration*, and its work to be purely honorary.—A letter, dated September 21st, was read from Dr. J. Crevaux, the successful explorer of the interior of Guiana, announcing that he had ascended the River Oyapok to its sources, and crossed the Tumac-humac Range forming the water-parting between the Guiana rivers and the Amazons. He was in perfect health, had succeeded in transporting his instruments without damage, and had made numerous observations.—The following papers were read:—(1) "Review of the '*Géographie historique et Administration de la Gaule Romaine*,' par M. Ernest Desjardins," by M. Vidal-Lablache, and (2) "Nouvelle Calédonie," by M. Jules Garnier. M. Garnier stated that he had passed three years in New Caledonia, charged by the Ministre de la Marine et des Colonies with the investigation of the mineral resources of the colony, which he had traversed in every direction, living the life of the natives. The usual vegetable productions of the tropics grew well in the island, but excepting coffee and tobacco they were subject to periodical destruction by invasions of grasshoppers. Cotton, moreover, was liable to damage during the rainy season, which, coinciding with the gathering of the crop, destroyed the produce. There were several oil-yielding plants, and the culture of the mulberry and silkworm had been introduced with success. The forest contained many useful timber trees; but the most active industry was the rearing of cattle, in which an active export trade was carried on with Australia. In other animal products there was nothing of commercial value except the fish, which were abundant and of great variety. The chief source of wealth in the island is, however, its metallic products. It is rich in gold, copper, and nickel, the latter presenting itself in the form of a magnesian hydro-silicate, which has received from Professor Dana the name of Garnierite, and is destined to take in a short time a high rank in the European markets. After passing in review the various public works of the island, such as the postal service, telegraphs, roads, &c., M. Garnier gave an account of the native inhabitants—in number amounting to 35,000 (the whites being 17,000)—and concluded by tracing the causes of the recent revolt to the inevitable conflict which must ensue in newly colonised countries between immigrants and the native owners of the soil; in this case it was a transient state of things which would not seriously interfere with the progress of the colony.

International Congress of Commercial Geography.—This Congress, promoted by the new *Société de Géographie Commerciale* of Paris, was held in the Tuileries and at the Trocadero during the Exhibition at the close of last September, MM. Meurand, Levasseur, and Cortambert being the presidents. M. Teisserenc de Bort, Minister of Commerce, inaugurated its labours by calling attention to the importance of geographical studies as applied to commerce, and to some cognate matters. The Congress proved a success; the meetings were well attended, a large number of foreign governments and most of the geographical societies of the world being represented by delegates. Numerous recommendations were made by the Congress, but only a few of the more prominent matters of discussion can be here briefly alluded to. The subject which seems to have excited the most interest was that of the proposed interoceanic canal across the American Isthmus. Lieutenant Lucien N. B. Wyse gave an account of his recent explorations in the Isthmus of Darien, which resulted in showing that no line for a canal, on the level, without locks

or tunnels, was possible, and after considerable discussion the Congress referred the whole question to the International Committee (founded under the presidency of M. de Lesseps) with a view to the definite settlement of the best route to be followed.—Attention was also called to the importance of the trade route through Tonquin, by the Sung-koi, to South-Western China, thrown open by the French treaty of 1874; and it was recommended that France should take measures to ensure the execution of that treaty.—Communications on matters relating to emigration were made by MM. Hertz, Bruniatti, and Bioune, and it was recommended that emigration councils should be formed in all countries for the purpose of affording information and assistance to emigrants, and that special laws should everywhere be enacted or put into force (as the case might be) for their protection. The general question of the promotion of emigration among the African races was carefully discussed, and finally referred to the International African Association.—The question of establishing museums of commercial geography gave rise to much diversity of opinion, and in the end, though no definite resolution was arrived at, a hope was expressed that existing institutions would do their utmost to promote the object in view by making exchanges with one another, and by assisting in the formation of new museums where practicable.—It was decided that the Congress should be an annual institution, and arrangements have been made for holding the next meeting at Brussels in September, 1879.

Geographical Society of Berlin.—October 5th, 1878: BARON VON RICHTHOFEN, President, in the Chair.—At this, the first meeting of the Society after the summer vacation, the President gave an account of the Expeditions now on foot under the auspices of the German African Society. Speaking first of Herr Schütt, who had been sent to explore the interior of West Africa from Loanda, he said a letter had been received from him, dated the beginning of July, announcing the commencement of his great plan of exploration *viâ* Cassange towards the north-east. In the same region, Major von Mechow, another traveller, had set himself the task of exploring the Quango and the lower course of the Congo, but not entirely as an emissary of the African Society. A great addition had been made to the band of African explorers in Dr. Buchner, who was preparing to leave Europe in the course of the month for Loanda, in order to penetrate the interior eastward from Malange. In the north, the well-known traveller Gerhard Rohlfs was about to attack the problem of West Central African geography, by a march southward from Tripoli through Wadai; and would depart on his journey, with his companion Dr. Stecker, in a few days.—Herr Gerhard Rohlfs, who was present at the meeting, gave a brief account of his proposed route. Subject to changes of plan which circumstances might force upon him, he proposed to make Tripoli his starting-point, on the ground that it was a place well supplied with the necessary resources, and long familiar to him, and that he could enlist a party from among his former travelling companions there residing. Travelling thence across the desert, independent of native caravans, he intended first to make for Sogna; beyond this place an unexplored region would lie before him as far as Sella, whence fifteen days' march would take him to the oasis Kutarah, one of the few in the Sahara yet unvisited by Europeans. Continuing southward from Kutarah, he should try to reach Wadai *viâ* Waujanga. As the present Sultan of Wadai had shown himself friendly to Dr. Nachtigal, the only traveller who had passed through this difficult country, he hoped to meet with an equally kind reception at the hands of this ruler, to ensure which he carried valuable presents destined for him.* Should he meet with insurmountable opposition, he was

* On his arrival at Tripoli, Herr Rohlfs learnt that the Sultan Ali was dead. He has been succeeded by his brother Jousouf, who has shown an equally friendly disposition towards foreigners.

prepared to march westward to Bornu, and make this the further starting-point for his journey across the unknown central region. His plan, at present, was to follow from Lake Chad the course of the Shari up to its head-waters, and then explore the watershed between the Congo, Ogowé, Shari, and other rivers. If he succeeded in accomplishing this, his objects would be fully attained.

Papers were read by Dr. Buchner, "On the Fiji Islands, more especially *Kandavu*"; and by Dr. G. Radde (Director of the Transcaucasian Museum at Tiflis), on a "Journey from Tiflis to the *Chewsures* (Kevsurs) Country in the Caucasus." Herr H. Kiepert exhibited a telegraph survey chart (communicated by General Schindler of the Persian Service) of a part of the Persian table-land (section Ispahan-Shushtér); also his most recent map of Cyprus, revised from material furnished by Dr. Schröder.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

ASIA.

Burton, R. F.—The Gold-mines of Midian, and the Ruined Midianitic Cities. A fortnight's tour in North-western Arabia. London (Paul): 1878, 8vo., pp. 398, map.

The results of a hurried reconnaissance, in which the author proves the existence of gold, with iron and other metals, in the Arabian peninsula. Some botanical and faunistic observations are made, and incidentally many errors of position and nomenclature in former authorities are corrected.

Central and Eastern Asia.—Recueil d'Itinéraires et de Voyages dans l'Asie Centrale et l'extrême Orient. Paris (Leroux): 1878, large 8vo., pp. 380, map. (*Dulau.*)

Forms vol. vii. of the "Publications de l'École des Langues Orientales vivantes," and contains the following articles: (1) "Journal d'une Mission en Corée." An account, with map, of the proceedings of the embassy sent from China to Corea in 1866, on the king's marriage; translated from the Chinese of Koei-Ling, with explanatory notes, by F. Scherzer. (2) "Mémoires d'un Voyageur Chinois dans l'empire d'Annam." Tsai-tin-lang, the original author, visited Annam in 1835; his notes were translated into Russian in 1872, and are now retranslated into French by L. Leger, with an orthographical index of Chinese proper names. (3) "Itinéraires de l'Asie Centrale." Translated from the Russian of A. Khorochkine, who was killed in the Kokand expedition of 1875. The routes are from Orenburg to Kazalinsk, from Kazalinsk to Tashkend, from Tashkend to Toqmaq, Kokand, and Samarcand, and from Kokand to Chodshend, with descriptions of Kokand and (fully) Samarcand. (4) "Description de la Mosquée de Hazret, située dans la Ville de Turkestan," by Mir Salih Bektchourin, taken from the 'Revue Militaire Russe' of August, 1866. (5) "Itinéraire de la Vallée du moyen Zerefchau" (1868), translated by L. Leger from the Russian of T. Radloff in the Memoirs of the Russian Geographical Society. (6) "Itinéraires de Pichâver à Kaboul, de Kaboul à Qandahar, et de Qandahar à Hérât," translated from the "Tarikhi Ahmed" of Mohammed Abdoul Kerim Mouchy.

Cochin China.—La Cochin-Chine Française en 1878, par le Comité agricole et industriel de la Cochin-Chine. Paris (Challamel): 1878, 8vo., maps, plans. (*Dulau.*)

Cust, R. N.—A Sketch of the Modern Languages of the East Indies. London (Trübner): 1878, 8vo., pp. 198, 2 maps in cover.

In this useful collection of scattered information upon the languages of the East Indies, special attention is given to the geographical distribution of the various families and branches discussed. The maps of India and border-lands, and of Further India and the Indian Archipelago, are coloured according to groups, and will be found of material assistance.

Forbes, C. J. F. S.—British Burma and its People: being Sketches of Native Manners, Customs, and Religion. London (Murray): 1878, sq. 8vo., pp. 364.

The result of thirteen years' official and private intercourse.

Ganzenmüller, K.—Tibet, nach den Resultaten geographischer Forschungen früherer und neuester Zeit. Mit einer Einleitung von H. von Schlagintweit-Sakünlinski. Stuttgart (Levy & Müller): 1878, 8vo., pp. 132. (*Asher.*)

A compendious summary, derived from various authentic sources.

Geary, Grattan.—Through Asiatic Turkey. Narrative of a Journey from Bombay to the Bosphorus. London (Sampson Low): 1878, 2 vols., sq. 8vo., pp. 339 and 356, map, pls.

The author's route is from Bombay to the head of the Persian Gulf, then following the Tigris to Bagdad, from which city he took a course to the east of the river as far as Zab, returning to it at Mosul, and reaching Alexandretta via Diarbekr. The work is more politically than geographically interesting, and discusses the possible lines of railway.

Lockwood, E.—Natural History, Sport, and Travel. London (Allen): 1878, sq. 8vo., pp. 284, illustrations.

The author was for some years magistrate of Monghyr (Lower Provinces, Bengal), and gives a series of valuable and minute observations on the general physical condition of his district, its fauna and flora, people, &c. His opinion is opposed to irrigation as a permanent preventive of famine.

Radde, G.—Die Chewsuren und ihr Land (ein monographischer Versuch), untersucht im Sommer 1876. Cassell (Fischer): 1878, 8vo., pp. 355, map, pls., woodcuts. (*Dulau.*)

A monograph of three small and ethnologically little known groups of people, "Chewsuren," "Pshawen," and "Tuschen" (the first two being the "Khevsours" and "Ph'tchavy" of Teller), distributed about the head-waters of the Jora, Aragwa, Kura, and Alasan, some 50 English miles N.N.E. of Tiflis, on the slope of the northern range of the Caucasus. There is an unintelligible error in the graduated meridian of the map given, but the locality may be approximately defined as 45° E. long., and 42° 30' N. lat. Dr. Radde discusses and illustrates the salient features of the country, as well as the distribution, dress, customs, &c., of the people, and gives a botanical appendix.

Rousset, L.—A travers la Chine. Paris (Hachette): 1878, 12mo., pp. 429, map. (*Dulau.*)

The author visited China in 1868, and crossed the empire almost to its extreme north-west. The most interesting portion of his route is given on his map, with sections. Starting from Wu-chang on the Yang-tsze, he followed the river Han N.W. to Sian-yang, where his routes diverged. The westerly one kept to the river, reaching Chang-chow by its Tan affluent up to the head-waters in the Sin-ling mountains, which were crossed, and the Hwang-ho struck at Tung-kwan. The easterly route followed the Pe-ho from Sian-yang to Nan-yang, cutting the head tributaries of the Cha river, and turning N.W. at Kia; after passing Yu-chow, it reached the Hwang-ho above Tung-kwan at Chen-chow. From Tung-kwan, the author proceeded to the mission station at Si-nganfu on the Wei-ho; he then followed the Kin-ho in a north-westerly direction via Kin-chow and Chen-ning-chow to Lan-chow on the upper waters of the Hwhang-ho, within 200 miles of Koko Nor.

Ujfalvy de Mezö-Kövesd, C. E. de.—Le Kohistan, le Ferghanah et Kouldja, avec un Appendice sur la Kachgarie. Paris (Leroux): 1878, large 8vo., pp. 186, maps, pls., tables. (*Dulau.*)

The first of three proposed volumes embodying the results of the French Scientific Expedition in Russia, Siberia, and Turkestan. The author's attention was in the first instance devoted to ethnology, but without neglecting geography and archaeology. His route appears from the map to have been from St. Petersburg to Kazalinsk on the Sea of Aral via Moscow and Orenburg, thence following the Syr Daria to Tashkend, with digressions to Samarcand and Kokand (Och the furthest eastern point reached); returning to Tashkend, he skirted the north of the Thian-Shan range to Kulija, and then struck northwards to Omsk, via Semipalatinsk, from which place he again passed west to Oren-

hurg, through Troitsk. A general ethnographical map of Central Asia is given, with similar maps on a larger scale for Kohistan, Ferghanah, and Kuldja, and statistical tables. There are also voluminous tables of anthropological measurements referring to the people of Kohistan.

AMERICA.

Bastian, A.—*Die Culturländer des alten America.* Bd. I, Ein Jahr auf Reisen, pp. 704, 2 maps; Bd. II, Beiträge zu geschichtlichen Vorarbeiten, pp. 967, pl. Berlin (Weidmann): 1878, 8vo. (*Williams & Norgate.*)

The first volume gives details of the author's journeys in South America (of which those in Ecuador, Colombia, and Guatemala are shown on the maps), with a dissertation on the religion and customs of ancient Peru. The second volume consists of elaborate comparative disquisitions on the history, religions, customs, &c., of the races of Mexico, the Antilles, the Isthmus, and Peru.

British Guiana at the Paris Exhibition.—Catalogue of Exhibits; to which are prefixed some illustrative notices of the Colony. Edited by William Walker. London (Stanford): 1878, pp. 133 and 24, frontisp., map.

An account of the physical geography, flora, fauna, manufactures, and chief statistics of the Colony, to date.

Fleming, Sandford.—*Canadian Pacific Railway.* Reports and Documents in reference to the location of the Line and a Western Terminal Harbour. Ottawa: 1878, 8vo., pp. 104, maps.

After an account of the past season's investigations, and a comparison of the different western terminal stations proposed, of which Burrard's Inlet is preferred by the author, detailed reports are given (amongst other matter) of explorations from Port Simpson via the River Skeena to Fort George, and of the Pine River Pass. All the projected Lines are shown.

Hesse-Wartegg, Ernst von.—*Nord-Amerika, seine Städte und Naturwunder, sein Land und seine Leute.* Bd. I. Leipzig (Weigel): 1879, 4to., pp. 226, plates (*Asher.*)

To be completed in 3 vols., with the assistance of Brachvogel, Harte, Kirchhoff, Lamothe, Nordhoff, Ratzel, Bayard Taylor, and other authorities. An excellently illustrated general account of the United States and its peoples.

Paz Soldan, M. F.—*Diccionario Geográfico Estadístico del Peru, contiene ademas la Etimologia Aymara y Quechua de las principales Poblaciones, Lagos, Rios, Cerros, &c.* Lima (Imprenta del Estado): 1877, fo., pp. 1077.

The result of 36 years' labour, containing brief notices, with statistics where possible, of 30,233 principal places. The work is practically a gazetteer, with the addition of etymological material, and in which attention is given rather to geography and population statistics than to politics or economy. A comprehensive general introduction is given.

Ratzel, F.—*Die Vereinigten Staaten von Nord-Amerika. Erster Band. Physikalische Geographie und Naturcharakter.* München (Oldenbourg): 1878, large 8vo., pp. 667, coloured maps, woodcuts. (*Williams & Norgate.*)

The maps illustrate the geology, elevations, temperatures, rainfall, and distribution of forests in the United States; and the whole work, which is based upon official surveys and other trustworthy publications, represents in a clear way the great physical characters of the northern American continent.

— *Aus Mexico. Reiseskizzen aus den Jahren 1874 und 1875.* Breslau (Kern): 1878, 8vo., pp. 426, map. (*Asher.*)

The map is exclusively physical.

Sachs, C.—*Aus den Llanos: Schilderung einer naturwissenschaftlichen Reise nach Venezuela.* Leipzig (Veit): 1879, 8vo., pp. 369, illustrations. (*Williams & Norgate.*)

A posthumous work, the author having lost his life on the Swiss Alps after his return from South America. Discusses the flora, fauna, and general physical features of the Venezuelan pampas, with many interesting and original observations. A sketch-map of Calabozo and its environs is given.

Stanford's Compendium of Geography and Travels based on Hellwald's 'Die Erde und ihre Völker.' Central America, the West Indies, and South America, edited and extended by H. W. Bates, with ethnological appendix by A. H. Keane. London (Stanford): 1878, 8vo., pp. 571, 13 maps, illustrations.

An adaptation of the German work, largely increased and corrected, especially as to the geographical relations of Faunas and Floras, and otherwise supplemented to date with statistics and information derived from recent English travellers.

Zeballos, E. S.—*La Conquista de Quince Mil Leguas: Estudio sobre la translacion de la frontera sud de la Republica al Rio Negro.* Buenos Aires (Coni): 1878, 8vo., pp. 370, maps.

After an historical sketch, from 1768 to date, of the various positions ascribed to the southern frontier of the Argentine States, so long a contested point with Chili, an account is given of geographical explorations since 1690, followed by descriptions of the Rio Negro and its affluents, the Rio Colorado, the rivers of the Andes and Central Pampas (Diamante, Atuel Salado, Malargue, Ocupal, &c.), and of the territory generally. The recent operations attending the southern extension of the frontier by the combined Chilian and Argentine forces are then narrated, with particulars of the Indian tribes. A chapter on the navigation of the rivers of the interior, and another on the bibliography and cartography of the region, complete this useful compilation. An appendix contains official papers on the extension of the frontier to the rivers Negro and Neuquen, and on Araucania.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

ASIA.

Russian General Staff, St. Petersburg.—Map of the Turkistan Military Province, constructed by the Turkistan Military Topographical Department in 1877, according to the most recent sources. 1:1,680,000 or 23 geographical miles to the inch. Russian General Staff, St. Petersburg, 1878. (*Dulau.*)

This map is a chromo-lithograph in 12 sheets (in Russian character), and includes that portion of Central Asia contained between lat. 34° 30' N. and 52° N.; its extent in longitude in its northern limit is from long. 45° 20' to 95° 20' East of Greenwich, and its southern limit from long. 52° 50' to 91° East of Greenwich. The Orography is shown by five different shades of drab, indicating heights, from under 1000 feet to over 10,000 feet. Roads, Caravan Routes, Mountain Passes, and all physical features of military importance are laid down, and distinguished by their proper symbols. The sheets which contain the most valuable additions to cartography are Nos. 11 and 12, which show the route surveys of Colonel Prejevalski and Captain Kostenko. On sheet 11 the Kara-kul is drawn, with the large island which so nearly converts it into two lakes, and the Russian boundary is laid down as including the lake; the Plateau of the Alai shows a double range of mountains, and the course of the Ak-su on this map is different from that shown on the third edition of Colonel Walker's map of Turkistan. On sheet 12 is shown the route survey by Colonel Prejevalski, of the country between Kuldja and the Altyn-Tag, including portions of the little Yulduz in the Thian Shan Range), and about 100 miles of the course of the Tarim River and its affluent, the Kuk-alla, and Lob-nor. These are some, among many of the points of interest to geographers contained in this map; but the work done by the officers employed by the Government of India in the years 1873-74 does not appear to be laid down; as, for example, Captain Trotter's route survey from Kashgar over the Pamirs, and its continuation by the Mun-shi along the valley of the Upper Oxus.

Kiepert, H.—New Original Map of the Island of Cyprus; 1:400,000 or 5.5 geographical miles to an inch. Berlin (Dietrich Reimer), 1878. (*Dulau.*)

The coast-line and some portions of the interior are from Admiralty Chart No. 2074; the greater part of the routes in the interior are from the observa-

tions of Dr. Paul Schroeder and others; the positions of many of the villages have been taken from two original maps, which have never been published, one by Camille Callier, the other by Consul Cerrutti, and which are now in the Royal Library at Berlin.

Fauvel, A. A.—Province du Shantung, par A. Fauvel; 1:656,964 or 9 geographical miles to an inch. Paris (Lanée), 1878. (*Dulau*.)

The names in this map are given in Chinese character, and also in French.

Ramsay, Dr. A. C.—Stanford's Orographical Map of Asia; scale 1:8,905,512 or 122 geographical miles to an inch. (*Stanford*.)

China Inland Mission.—Map of China, prepared for the China Inland Mission; 1:6,934,620 or 95 geographical miles to an inch. (*China Inland Mission of London*.)

This map shows the routes of missionaries in the following provinces:—Burmah, Kan-suh, Shen-si, Shan-si, Ho-nan, Si-chuen, Hu-nan and Kweichau, Yun-nan, Kwang-si, Kaing-si, Gan-hwuy, Kiang-su, Chch-kiang. The names of the missionaries who performed the journeys, and the principal cities and towns through which they passed, are also given. It will be seen on inspecting this map that the distance traversed in some cases reaches 3000 miles.

AFRICA.

Quartermaster-General's Department.—Eastern Portion of South Africa; compiled and lithographed at the Intelligence Department under the direction of Captain C. E. Grover, D.A.Q.M.G. Scale 1:633,600 or 8.6 geographical miles to an inch.

These sheets of the map of South Africa contain much information as to the landing-places, &c., on the coast.

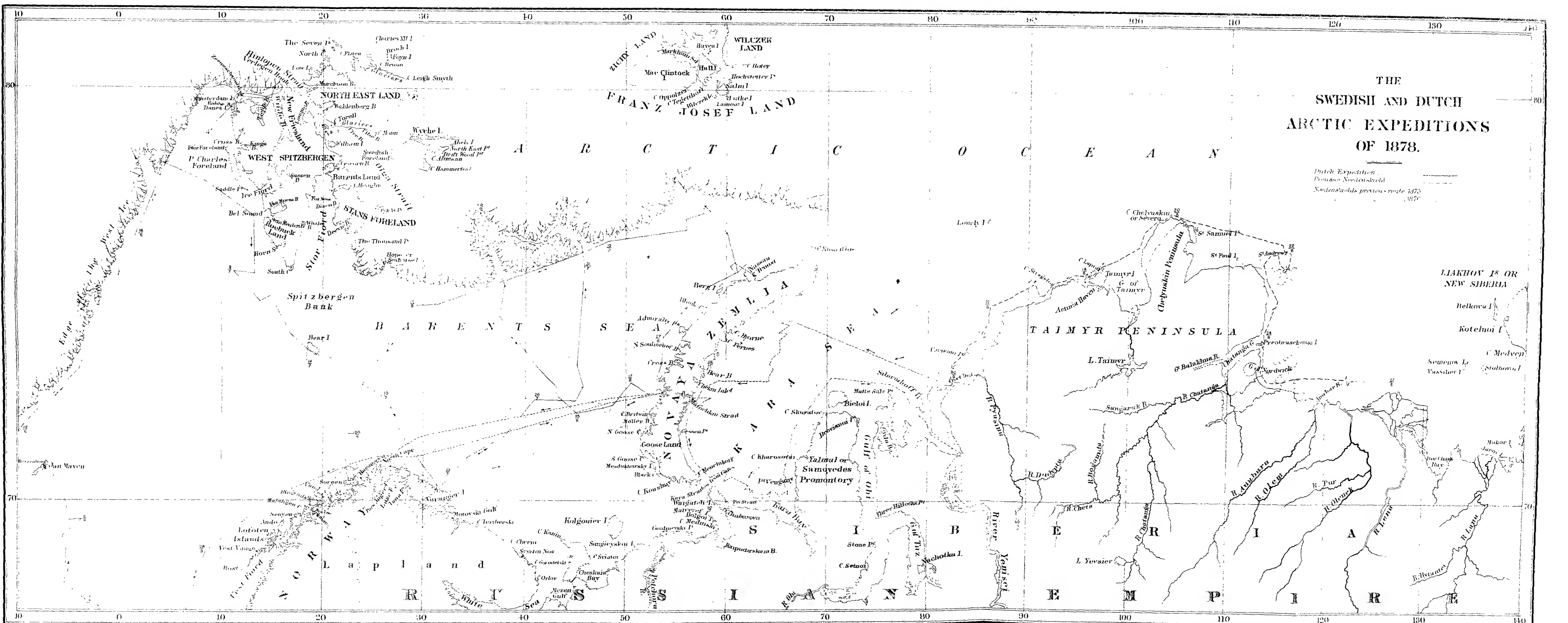
Stanley, H. M.—Map showing the Explorations by land and water in Equatorial Africa, of H. M. Stanley, in the years 1874-77. Scale 1:2,919,840 or 40 geographical miles to an inch. (*Sampson Low & Co.*)

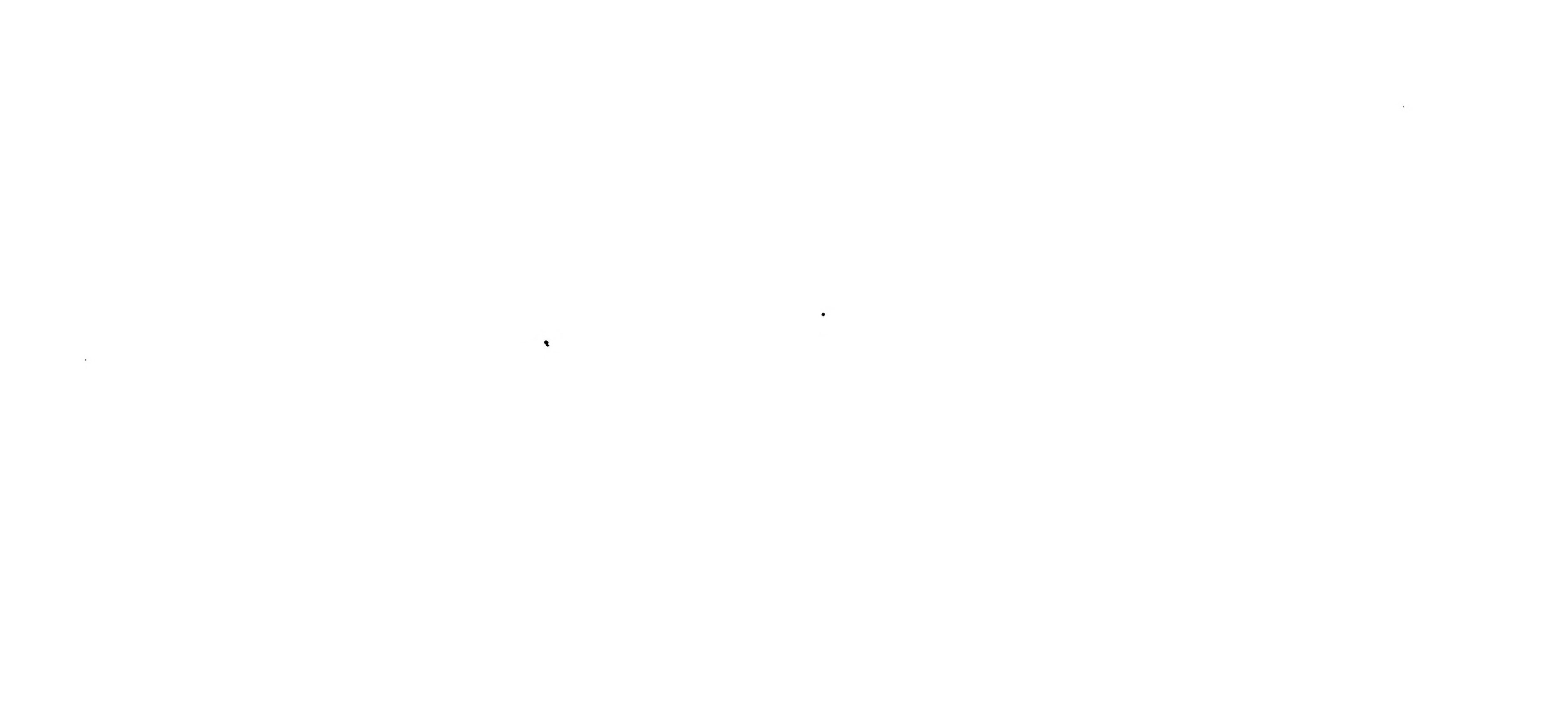
This map consists of two sheets, each with a separate title, but when joined, making a fine map of Equatorial Africa. It has been especially drawn to illustrate Mr. Stanley's explorations; his route is shown by a red line, and the map itself is a lithograph with lakes and sea coloured blue. The most important feature in this map is the River Congo, or, as Mr. Stanley calls it, the Livingstone, whose course he followed from Nyangwe to its mouth, with the exception of that portion between the Isangila Falls and Boma. The names of many towns and villages on the banks of the river are given, as are also the names of many affluents, the principal being the Wavinza, the Arruwimi, the Ukere, the Samkuru, the Bangala, the Ikembaba. The positions of the cataracts in Uregga (five in number) are given, as also the numerous falls and rapids between Stanley Pool and the Yellala Falls. Second only to the Congo in importance is the change in the positions and configuration of the great African lakes. Beginning at the most northern, Albert Nyanza, it will be seen that its size is very considerably curtailed, and that Mr. Stanley has adopted the survey of Colonel Mason-Bey, and also that the Beatrice Gulf is laid down as a portion of an enormous lake, the Muta-Nzigé (the former native name of the Albert Lake). The whole configuration of the Victoria Nyanza has been altered, but not to nearly the same extent as the Albert; the same may be said of Lake Tanganyika, which has also been moved further to the westward. Lake Bangweolo is put back into the position given to it by Livingstone, from which it had been moved in Commander Cameron's map, and Lake Nyassa is laid down as given by Mr. Cotterill in his recent explorations; the Portuguese province of Angola is taken from the Portuguese Government map. There are other changes too numerous to mention in this notice.

Mackinnon-Buxton Expedition.—Sketch-map of the route of the Mackinnon-Buxton Expedition on the East Coast of Africa, showing 26 miles of the road in course of construction from Dar-es-Salaam into the interior, in the direction of the Livingstone Range at the northern end of Lake Nyassa. Scale 1:255,486 or 3.5 geographical miles to an inch.

THE SWEDISH AND DUTCH ARCTIC EXPEDITIONS OF 1878.

Dutch Expedition.
 Precaution Nordenskiöld
 Nordenskiöld's previous route 1873-1879





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Usambara Country in East Africa.

By the Rev. J. P. FARLER, B.A., Universities' Mission.

(Read at the Evening Meeting, November 25th, 1878.)

THE country under notice is not altogether unknown to the Royal Geographical Society. Its reports contain notices of the travels and discoveries of the veteran missionary Dr. Krapf, of Messrs. Burton and Speke, of the lamented Mr. New, and of my predecessor, the Rev. Charles A. Alington; each of whom has left on record some of the salient features of the country.

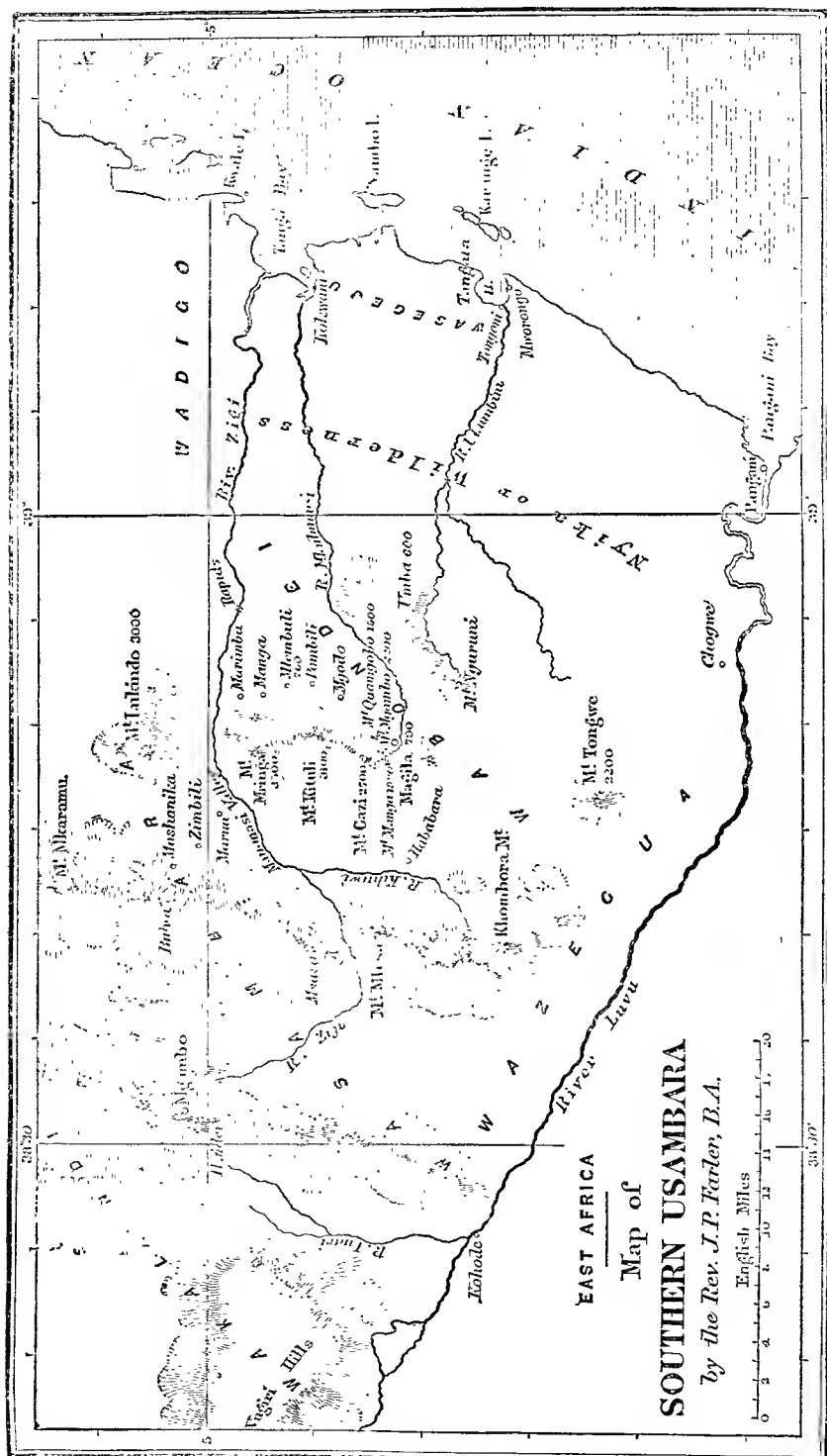
Dr. Krapf was the first European traveller who visited Usambara. Starting from Mombasa in July, 1848, he reached the northern spur of a mountain called Pambiri. Then crossing a river which he called Emgambo, he went westward and ascended the range of mountains called Makaeri. I have never heard of this name, but from the description it must have been the Mkaramu Range. After five days' "weary pilgrimage" in a south-west direction across the Usambara Mountains, he arrived at Vuga. He was well received by the king, who gave him two soldiers to accompany him on his return as far as the Luvu River, and in six days he arrived at Pangani. In his account of this journey, Krapf gives no description of the country or people. In 1851 he made a second journey into Usambara, starting from Pangani. He then seems to have been taken a very circuitous route to Vuga, going north of Mringa, but I suppose Kimweri's officers had received orders to bring him that way. Kimweri was at that time in the zenith of his power. Dr. Krapf returned to Pangani along the northern bank of the Luvu. The names of many of the places Krapf passed in his journeys seem to have been changed since he visited them; it is therefore difficult to make out his actual course.

In 1857 Messrs. Burton and Speke made a journey from Pangani
No. II.—FEB. 1879.]

to Vuga and back. At Vuga they were admitted to an interview with Kimweri, at that time an old man dying of age and decay; the town then contained about 500 huts and 3000 inhabitants, and the surrounding highlands were thickly populated. Mr. Alington, of the Universities' Mission, was the next traveller who visited Vuga. He started from Mworongo on September 18th, 1867, and reached Vuga on September 27th. There he saw Sekalavu, Kimweri's eldest son, who represented his father, and gave him permission to build a mission-house at Magila, on the condition that it was not built of stone so as to serve as a fort. In June, the following year, Mr. Alington again visited Kimweri, but the old man was very ill and could not see him. Kimweri died in October of the same year. He was said to be more than one hundred years old, and to have left nearly one hundred sons.

In 1874, the late Mr. New, of the Livingstone Relief Expedition, marched from Pangani to Vuga, and through Usambara to Mombasa. He made the acquaintance of Simboja, one of Kimweri's many sons, now the chief of the Wakalindi tribe. He seems to have told him that his son Kimweri was the paramount chief, but a year afterwards, in 1875, when I went to Usambara, this was certainly not the case, and although Simboja has left Vuga to live at Mazindi, Kimweri is still subordinate to him. After a stay of more than a week at Vuga, New made his way across the Usambara mountains in a north-easterly direction; he then descended to the plain on the northern side of the range, and advanced to Mombasa through the lowlands of the Wadigo. Unfortunately, he gave no account of this part of his journey, although, from its being through an entirely new country, it would have been especially interesting.

I will now proceed to describe the Usambara country as it is at the present time. Usambara has been called the Switzerland of Africa. It forms a link in the great East Coast Range which extends from Abyssinia to Natal. Speaking roughly, it lies between $4^{\circ} 20'$ and $5^{\circ} 25'$ lat. S., and $38^{\circ} 20'$ and $39^{\circ} 10'$ long. E. The mountains form four detached lines running due north and south, rising in the higher peaks to about 6000 feet above the sea-level. They are separated from each other by elevated valleys, table-lands, and terraces. The whole range was evidently thrown up by volcanic action, and consists of granite mixed with spar, with sandstone in the lower spurs containing plumbago. As a rule the mountains are covered with jungle to their summits, but in some of the higher peaks the granite is exposed in the shape of massive blocks which take the most fantastic forms. Some of the hill-tops are without trees, and then they are covered with a soft elastic turf. The scenery is beautiful and varied; now soft valleys and hill-sides with hanging woods, then wild ravines with precipitous cliffs of bare granite. The country is well watered; every mountain has its spring,



and every valley its streamlet. It is divided into four districts, inhabited by people who call themselves by different names. First, the Wakalindi, living upon the fourth line of mountains, and on the northern spurs of the second and third ranges; next, the Wasambara, inhabiting the first three lines of mountains; then the Wabondeis, which means "people of the valley," or lowlanders, living upon the lower spurs of the eastern side of the first range, and in the plain between the Mrima and the sea-coast; and lastly, the Wambugu inhabiting the plain to the north of the Mkaramu Mountains. On the banks of the Luvu and in the valleys between the ranges, the people are mostly Wazegua settlers. All this country was ruled over by Kimweri, who was fifth in descent from Mkande, who founded the dynasty.

I have frequently written letters for the present chiefs, Kibanga and Mkange, to summon their *akidas*, and always wrote them in the name of "the sons of Mkande." The story told me by one of Kimweri's sons was that Mkande was a great hunter, who lived in a country north of Chaga. In one of his hunting expeditions he came down to Usambara, and there killed a huge buffalo. The Wasambara were so struck by his prowess in the chase, that they invited him to be their king. He must have been a man of some force of character; for he at once commenced to organise his new kingdom, bringing into subjection the Wazegua, who inhabited the plains and valleys north of the Luvu, the Wabondeis, and the Wambugu. The Wakalindi claim descent from him, and continued to be the ruling caste until old Kimweri's death. They were constantly increasing their numbers by adopting favourite slaves, who thus became Wakalindi; but we can easily understand their becoming a numerous tribe in five generations, if every member of the family was as prolific as old Kimweri, with his hundred sons and unknown number of daughters.

At the death of old Kimweri in 1868, according to the order of the succession, Sekalavu his eldest son succeeded him, taking the name of Kimweri. He lived but one year after his father's death, and was succeeded by his son Kinyassi, at that time, in 1869, a boy eight years old. Simboja, the second son of old Kimweri, now rebelled, and collecting a large force, fought Kinyassi's followers, who were led by his uncles Kibanga and Mkange. The young king's forces were defeated by Simboja, and Kibanga and Mkange fled from Vuga carrying Kinyassi with them. The Wakalindi followed Simboja, while the Wasambara elung to Kinyassi. Simboja reigned at Vuga, but the kingdom was broken up, and Vuga destroyed; and it is now only a small village. Kibanga and Mkange divided Usambara between them and ruled it in the name of Kinyassi; Kibanga taking the southern portion to the banks of the Luvu, while Mkange rules over the northern portion, including the Wambugu; Kinyassi, now a lad of seventeen, lives at Hundu, a town in the north. The Wabondeis took advantage of these

troubles, and declared themselves independent. Maliko, Wali of Fort Tongwe (a slave of Seyyid Majid, the late Sultan of Zanzibar), assisted them with arms to drive out their Wakalindi governors; this they succeeded in doing, and since then they have called themselves Wakiva, which literally translated means, republicans. Michael Kifungiwe, a son of Kimweri, and the governor of Magila, on account of his kindly disposition, alone was allowed to remain in the country, but he was reduced to a private station.

Vuga having been nearly destroyed by the revolution, Simboja made Mazindi his capital, a town about two days' journey to the south-west of Vuga, and gave Vuga to his eldest son Kimweri.

Usambara is drained by four rivers: the Zigi, with its affluent the Kihuwi, the Mkulumuzi, the Ukumbini, and the Luari rising in the Vuga Mountains and running south into the Luvu. The Zigi rises in the Hendei Mountains, near a town called Mgambo, and running south-east through a gorge in the second line between Mount Mlesha and Mount Msasa, runs north-east through the Mananasi Valley, and then running round the base of Mringa, it takes an easterly course into Tanga Bay. The Mkulumuzi rises in the southern peaks of the Magila Mountains and takes a north-easterly direction into Tanga Bay. This river supplies a great portion of the Bondei country with water, and it never ceases to run even in the seasons of the greatest drought.

The Ukumbini rises in an isolated hill called Kilima Nguruni, south-east of Magila. At first it runs north-east to Umba, and then takes an easterly course into Tangata Bay. In the dry season it ceases to run. None of these rivers are navigable, and the Zigi has rapids about 15 miles from its mouth.

The nearest port to Magila is Mworongo, a town on Tangata Bay, and it was here that we usually landed. This bay is defended from the monsoons by Yambo and Karange islands. The entrance to it is a deep channel about 100 yards wide. Except in the channel cut by the Ukumbini River, the bay is shallow, with a sandy bottom; but I have no doubt that by dredging it could be deepened sufficiently to form a commodious harbour. It is almost circular in shape, and about $1\frac{1}{2}$ mile in diameter. Tangata Bay is about 65 miles north-west of Zanzibar town.

Mworongo is surrounded by a low, well-built coralline wall, loop-holed for guns. This was built about fifty years ago to defend it from the attacks of the Wasegeju, who live on the opposite side of the bay, and along the coast as far as Tanga. They were accustomed to sweep into the bay with well-manned galleys, make a raid upon the Swahili villages, and plunder them completely, carrying off the inhabitants for slaves. I have been informed that Tangata Bay was once dry land. One old man pointed out to me a spot, now several feet under low-water mark, where his father's house stood in which he was born; and another patriarch showed me a spot, now entirely covered by the sea, where he

remembered a village and a grove of coco-nut trees. Evidences of the rapid encroachments of the sea are visible in many parts of the bay. After crossing a creek about 200 yards wide, forming the mouth of the Ukumbini River, which is fordable here at low water, we land at the town of Tongoni. Here the inhabitants keep up a perpetual struggle with the sea, which has left them now nothing but a narrow ridge of sand. They have built a coralline wall at the back of the town, and defended it from the water with the trunks of coco-nut trees. Their labours are, however, in vain, for the sea at high water forms a creek at the back of the town. Many of the coco-nut trunks are gone, there are great breaches in the wall, and the dreaded mangrove is now within. After leaving Tongoni, our path takes us for a mile along the creek covered with mangroves, and then we mount a low cliff of red-yellow sandstone, blackened here and there with oxide, with quartz scattered about on the surface. This cliff is about 50 feet high. For two miles the path goes through well-cultivated farms, and then the cultivation ceases and we find ourselves in the Nyika or wilderness. This is a rolling plain of coarse grass and thick bush, with here and there a thicket or a fine clump of trees. At times I have fancied myself in a well-kept park, and I have looked out for the mansion upon some knoll. In some parts the soil is sandy, but in others it is a rich vegetable loam. In the bottoms there are beds of whitish clay, and quartz is found in the dry watercourses.

Trees are in great variety, but for the most part of stunted growth. Euphorbias, fan-palms, and mimosa thorns are seen everywhere, and occasionally baobabs, tamarind-trees, and clusters of the *Borassus* palm. There is also a kind of wild plum-tree, called Mguaju by the natives. There are various kinds of animals found in the Nyika: antelopes, from the Kurungu, the size of a cow, to the Fuun, the size of a small goat; gazelles, lions, leopards, hyenas, and big apes, which cause great destruction to the crops of the coast people. The lions here, as elsewhere, chiefly infest the sea-shore. Occasionally the path goes through thickets of euphorbia and acacia, and the trees are often full of monkeys feeding upon the edible berries. About three hours' walk from Mworongo there is a deep well, never dry, also a grove of coco-nut trees, marking the site of a town called Kwamkembe, which was destroyed by the Wadigo. In the dry season this well is frequented by splendid butterflies and dragon-flies, but in the rainy season it overflows and forms a small lake. During the rainy season the path through the Nyika is for the most part under water, and even where there is a rise in the ground it does not improve, for then it acts as a watercourse, and it is far from pleasant walking to have to make your way against a small stream from 6 inches to 1 foot in depth.

It is impossible to avoid the path, on account of the giant grass and tangled thorns on either side. In the dry season the natives fire these

grasses, and if there is any wind the flames rage rapidly over the plain. I was once nearly caught in them, and it was only by a rapid flight that I saved myself.

Three hours' walk from Kwankembe brings us to a great baobab tree, upon which is inscribed the names of various members of the Universities' Mission. One hour later we reach "Mzungu's Well," dug by Mr. Alington. One hour's walking from this well brings us to the limits of the Nyika, which I should put at 16 miles wide, allowing that we walk two miles per hour. Many parts of this Nyika are most fertile, and I believe healthy; for I have frequently passed nights in it, sleeping in the open air, without experiencing any ill effects.

The country now changes its character; it rises considerably, and consists of hills and dales, with ridges 500 or 600 feet above the sea-level, forming a foundationary elevation for the Usambara Mountains. On the edge of the desert, and just where the ground begins to rise, there is the same formation of pisolitic limestone, containing marine fossils, which Speke observed in the Somali country, and again in the Wazaramo country, thus proving, I think, that this formation runs along the base of the East Coast Range from Somali-land, in 12° N. lat., to Uzaramo in 8° S. lat., and will probably be found to continue to Natal. The country is now cultivated, and the path takes us for about a mile through fields of rice, sorghum, and Indian corn; then, ascending a hill, we reach Yumba, the nearest Bondei town to the coast, which was, however, destroyed by a Wadigo raid last July. Passing this, we enter a jungle about a mile wide; still ascending, we reach the other side, and turning to the left, the path takes us up the hill, passing on the way a small village, to Umba, a town on the top of a hill 600 feet above the sea-level. It is stockaded and surrounded by jungle; it has three gates, one within the other, and near the outer gate there is an open shed, in which a guard is stationed every night to give an alarm in case of an attack of the Wadigo. Senkuli, the chief of the Umba district, has a residence here. A large *gulio* or market is held in the immediate neighbourhood of the town every Thursday, and it is frequented by the coast Swahili, who bring up dried fish, salt, iron hoes, and cotton cloths, to barter for rice, Indian corn, tobacco, and wild honey. The whole of the coast district, called Tangata, is supplied with grain from this market. Umba is not at all unhealthy, for two European members of the Universities' Mission have lived there for two years, without any serious illness or attacks of malarial fever. After leaving Umba, four hours' hard walking through a thickly populated and well-cultivated hilly country brings us to Magila, the chief station of the Universities' Mission in Bondei. The name Magila applies to the district as well as the mission-station, which is in lat. $5^{\circ} 9'$ S. and long. $38^{\circ} 48' 40''$ E. It is situated on the top of an isolated hill 790 feet above the sea-level, at the head of a valley running up between the southern spurs of the Magila Mountains.

This range, or rather group, is isolated, and rises directly out of the plain; it is about 12 miles long, with a tolerably straight ridge inclined due north and south. It has three principal peaks: Mringa, at the northern extremity, with bare granite head, 3500 feet above the sea-level; Kituli, the centre peak, 3100 feet; and Gazi, the southern peak, 2700 feet high. Besides Gazi, there is a cluster of lower peaks at the southern extremity: Quamgobo, 1500 feet high; Manga, 1980; and Mgambo, 2200. This range is mostly covered with jungle and trees of large size. Numerous villages are dotted about on the mountain side, and the huts with their conical grass roofs peep out from among the trees. On the lower spurs of the hills there are larger villages admirably situated either for defence or flight. North of the Zigi, in the same longitude as the Magila Mountain, there is another group rising abruptly out of the plain, the ridge forming a kind of right angle north, south, and east. It is called Mount Lukindo, and is 3000 feet above the level of the sea. It has several peaks with jungle at the bottom, and bare granite heads. The country around is called Bamba, and it is well cultivated, with a large population. The latitude of this mountain is $4^{\circ} 58' S$.

South of the Magila Mountain, and nearly in the same longitude, is the peak of Tongwe, 2000 feet above the sea-level, and across the Luvu, in the same line, the southernmost peak Genda Genda.

The River Mkulumuzi rises between the two peaks Manga and Mgambo; it dashes down the sides of the mountain, forming numerous beautiful cascades. In the rainy season it becomes a torrent, flooding all the valleys, carrying down great trees, and frequently drowning the natives in their attempts to cross it.

The stream has cut a deep bed for itself in the granite sides of the mountain, and exploring this bed in the dry season, I have found perfectly round well-like basins in the rock, varying from 1 foot in diameter and depth to 10 feet in diameter, and from 8 to 12 feet in depth. There is always a stone at the bottom of these basins, and they must have been formed by the torrent giving, during the rainy season, a rotary motion to the stone.

After we had been living at Magila some time, messengers arrived from Hendei bringing a letter from Kibanga, begging me to meet him and Simboja at Msasa, and arrange a peace between them. They had been fighting since Sekalavu's death in 1869, and they were now heartily tired of it. But each fearing treachery from the other, they did not like to meet without some better guarantee than their own promises. The coast slave-traders encouraged this warfare, and supplied at one time Simboja with powder and at another time Kibanga, on the condition that all captives taken by either party were to be sold to them for slaves. I at once accepted the invitation, and the next morning, August 28th, 1876, we set out. Our party consisted of six of my own

men, Michael Kifungiwe, Kibanga's brother, with two or three Bundeis, and the two messengers of Kibanga.

After leaving Magila our path took us at first in a southerly direction to avoid a spur of the Magila Mountains. It was a rolling, hilly country, well wooded and watered. We passed a good number of villages in clearings in the woods, also plantations of rice and Indian corn. Four hours from Magila we arrived at Hababara, a market town. We found no beach-people at the market, and no Swahili was spoken. The women were the chief traders, bringing their bananas, Indian corn, and tobacco, to exchange for beads, cotton cloth, and shark. After leaving Hababara we descended to the Kihwi, an affluent of the Zigi, rising in the Mlesha Mountains, a clear mountain stream, 30 feet wide and 3 feet deep, with sandy bottom. Our path now led more to the north, and we passed Matukuru, Masangombe, and Vumba. The character of the country now changed, all signs of cultivation and life ceased, the hills became steeper, and the walking proportionately more difficult. The forests had no jungle, but a light undergrowth of ferns. On our right were bare granite peaks, about 3000 feet above the sea-level, called Magomba, the western slopes of the Magila Mountain. Two hours after leaving the Kihwi we reached the Zigi, running N.N.E., here about 60 feet wide, and shallow, the bed being full of great boulders of granite brought down by the floods. Resting on these granite blocks were the trunks of large trees, sometimes 20 feet above the level of the river, showing what a mighty torrent the Zigi becomes in the rainy season. Immediately after crossing the Zigi we commenced the ascent of the Msasa Mountain, 3500 feet above the sea-level. It is covered at the base with jungle and large trees. Bamboos of great height, and 3 inches in diameter near the ground, grew among the trees. Higher up we found plantations of tobacco and Indian corn. Two-thirds up the mountain we rested at the village of Nguwye.

The Msasa Mountain is extremely difficult to climb on account of the excessive steepness of the sides. Even the natives admit that they can neither go up nor down in wet weather. On reaching the top, after two hours' hard climbing, we found a soft bed of turf, consisting of short grass and scented herbs. There were numerous wild orange trees, filling the air with fragrance. We also saw herds of cattle and goats browsing.

After a walk of a mile along the narrow ridge through groves of bananas, we arrived at the town of Msasa, and fired off our guns to announce our arrival. The next morning Kibanga arrived from Hendei with about 150 men who form his body-guard. As he entered the town, drums, horns, and a kind of bassoon were played before him, while all who possessed guns fired them off. He had with him a Comoro man, named Abdallah, who acts as his secretary and factotum. Our interview was cold and formal; but the chief became more confidential and

friendly in the course of our stay, and we left after an affectionate farewell, and a promise on my part to visit him again.

On the 6th of November we set out for Hendei. As we stood next day upon the Msasa Mountain, looking west, we saw before us an elevated valley covered with forest; on the opposite ridge, called the Hendei Mountain, we saw the smoke curling up from the trees and were told that there was Hendei.

We descended into the forest, which quite fulfilled my idea of a tropical forest. The trees were large, there was no jungle, only an endless variety of splendid ferns. We were six hours crossing this valley, and the trees entirely kept out the sunlight. When the men were not talking, there was a silence that became painful. The country is undulating, with now and then a great granite boulder covered with a growth of ferns. We saw no signs of life, neither men nor villages. When we arrived at Hendei, Kibanga gave us a hearty welcome, but said that it would not be safe to go through the country then, for he had received information that same morning that one of Simboja's sons had collected a force with the intention of making a raid upon Hendei. I had many applicants for medicines, and having brought some with me I prescribed for the sick. They took whatever I gave them with a faith that must have worked half the cure. Kibanga lived in a large well-built house containing several rooms, and a wide verandah before it, where he sat to receive his guests. The doors were well made in strong square frames. I thought it better to leave next morning, lest our presence should hamper Kibanga in his defence. At parting, Kibanga gave me one of his boys to take back with me to live at Magila, and he also gave us several cold roast fowls, and baskets of Ugali to eat on the journey, as it would be late before we reached our halting-place for the night. We returned by the northern route. Soon after leaving Hendei we crossed the Zigi near its source, here a narrow mountain streamlet. We then came to a village called Mgambo, which Kibanga has recently made his capital on account of the strength of its natural fortifications.

The hills frequently took the form of grassy cones, with clumps of trees and patches of jungle. For miles along the upper heights of the Hendei Mountains no trees were visible, only a short turf.

To the right and left of us, but at some distance from the path, we could see the smoke rising from tiny hamlets. In the valleys the foliage was most luxuriant. There were new species of orchids on the trees, ferns looking like miniature palm-trees, forming a trunk by the twisting stems of dead fronds, and palms of varieties unknown to me. Six hours' walking brought us to Bulwa, a town on the same range as Msasa. Here we saw Tanga harbour due east of us, and the Zigi meandering through the plain. This mountain is about 5000 feet above the sea-level. We descended into the valley, the path taking us near

the towns of Mashanika and Zimbili, and arrived in the evening at Marna, where we slept. The hut was so stifling that it was impossible to sleep in it; I therefore went outside, but the growling of the leopards warned me that it was hardly safe to sleep outside. I found a wattle house not yet plastered or thatched, and slept in it. We set out in the morning, southward through the Mananasi Valley, and crossed the Zigi at a ford called Ufinga. The river was here about 80 feet wide, and deep enough to conceal hippopotami, for we saw their fresh footprints on the bank. This valley is inhabited by Wazegua settlers.

We soon afterwards left the valley, the path taking us up the mountains, and now we went along the sides of the hills until we turned the peak of Gazi; then crossing the ridge, where we had a splendid view to the south over the Luvu, we descended into the Magila Valley, and arrived at Magila by noon. The ridges of these mountains were well cultivated, and there were several villages on the top.

The soil throughout Usambara is a red disintegrated clay upon a granite and sandstone foundation, and covered with a rich vegetable loam. The bottoms of the valleys contain beds of alluvial clay. I should say no more fertile soil could be found in the world, and it will, I am sure, produce every tropical plant. The flora of Usambara is extensive. In the forests we find ebony, copal, teak, acacia, the indiarubber-tree, the orchella weed, the betel-pepper climber, prickly-smilax, with several varieties of the strychnos tree, and many other trees producing valuable wood. On my return next summer I should be happy to welcome a scientific botanist as my guest, and should feel well repaid if he would teach us how to turn the vegetable wealth of the country to account.

The Wasambara are of the same stock as the people of Chaga. The languages are very similar, and there is a constant and friendly intercourse between the two tribes. Many of them are rather Semitic than Negro in their type, having high foreheads, while the prognathous jaw and spur heel are both wanting. In form and figure they are perfect, and they have frequently reminded me of bronze statues. They average 5 feet 7 inches in height, and are strong, though not robust. They vary in colour from a light brown to a deep black, not, however, the dead-black of many of the Negro tribes, but soft and shining like satin. They have fair mental powers; a few have learnt to write, but very badly. They have plenty of perception, and quickly reckon up the person with whom they have to deal; at first often rebellious, but if met with firmness always at last submitting. They are shrewd in the common affairs of daily life, hospitable, yet expecting a present. I have never found them ungrateful, and they nearly always repay a kindness. They are brave with a good leader, and modest, showing love for parents and respect for age.

Religion they have none, except a belief in charms and evil spirits. An offering of first-fruits is always made to the spirits, and in sickness a

sacrifice is offered to propitiate the pepo or spirit. This is usually done under the "spirit tree" near the entrance to the village. As the medicine man kills the goat, he cries, "O pepo, we bring you a present; please do not torment this person any more, but give him health again, and then we will bring you another present, a nice white fowl." The pepo, however, does not get much of the goat, for the friends of the sick man cook it and eat it, giving a very small piece to the pepo.

Their marriage ceremonies are peculiar. The young couple meet at the house of a friend; two native bedsteads are placed one on either side of the room, with a big fire between. On these the bride and bridegroom recline in the sight of each other for four days without food. Lukewarm water is allowed them when they are thirsty. On the fifth day one basin of thin porridge is given them before the bridal procession commences to the house of the bride's mother. The bridegroom walks first with his friends, his best man carrying a zebra's tail. The bride follows at a little distance on the back of a matron, surrounded by her friends. The chief bridesmaid is dressed as a man, and carries a sword and a gun. When they arrive before the house of the bride's mother, the men retire into another house, and a stool is put before the door for the bride to sit upon. The women then go round her with baskets of Indian corn, dropping some before her as they pass, until a large heap is made. The ceremony is completed by a great feast in the evening.

The Bondois are more robust than the highlanders on account of their living principally upon Indian corn, while the chief diet of the Wasambara is banana porridge. They are industrious, both men and women working in the fields. They export semsem seed, rice, Indian corn, indiarubber, and tobacco. Cotton of good quality is indigenous, but it is not cultivated. When we consider the wondrous fertility of this country, together with its vicinity to the coast, the mountains being only separated from the sea by a level plain of 30 miles, it is impossible to doubt but that it has a great future before it. I have had several pressing invitations from the chiefs to be their king; but I have been obliged to decline, as it would require far more capital to organise a government than I could command. But with a government that would develop its resources, it would quickly repay any money laid out upon it.

In September last year, Dr Kirk and Captain Wharton, accompanied by Lieutenant Gordon and Mr. Craven, visited Magila. They started from Tanga, spent several days at Magila, and then returned to Tanga, *via* Umba. Captain Wharton noted the heights of the mountains near, and took observations, fixing the latitude and longitude of Magila; while Dr. Kirk explored the hills, and collected botanical specimens.

The Masai Country.—During my residence at Magila I frequently came in contact with men who had been to Chaga and the Masai

country. From them I learned that Mandara, who was the chief of Chaga when New visited it, has since been conquered by another Chaga chief, and has now no power beyond his own town.

The Masai country consists of a level plateau with short isolated mountain chains, and single peaks rising from the centre of the plain. After leaving Kilimanjaro, the paths entirely cease, and the traveller has to find his way as best he can over the short grass. For many miles not a tree can be seen, and herds of wild animals are visible at a great distance. The Masai always encamp upon the hills for the sake of the water; they erect huts, but abandon them as soon as the feeding in the neighbourhood is exhausted, and then they move with their herds to another place. Both sexes dispense with clothes; they are tall and muscular, but thin in the legs. They are great walkers, and move rapidly over the country. They are entirely pastoral; their food consists of the flesh of their cattle, and milk mixed with blood. They have a very strong racial odour, and the people of other tribes declare that it would be impossible for a Masai to mix with other people without being at once detected. They are divided into numerous clans under different chiefs, who are entirely independent of each other, and frequently make war upon one another. They have some system of telegraphy by which the news of an approaching caravan is at once conveyed all over that part of the country. Their arms consist of a shield entirely covering the owner, consisting of several thicknesses of cow-hide; they carry two spears with blades 18 inches long and 3 inches wide, a short sword, and two heavy knob sticks.

The Masai in the neighbourhood of Chaga have adopted many of the habits of agricultural people, they dwell in permanent villages, cultivate Indian corn, and live on friendly terms with the Wachaga. They understand working in iron, and make their own weapons.

They do not use bows and arrows, and they have no guns. They are a very hardy race and strict monogamists; but so treacherous in their dealings with strangers, that the traders always find it necessary to construct intrenched camps to live in. Last year, 2000 well-armed Swahilis from Pangani, Tanga, and Saadani, set out for the Masai country to make war upon a Masai tribe, who are reported to build their houses and stockades with ivory, and refuse all intercourse with strangers or traders. Very few Swahili ever returned to tell the tale of their defeat.

The great mountain called Doenyo Ngai, west of Chaga, is said to have a bright light over it at night, and that it thunders. The Masai call it Doenyo Ngai, which means, "the mountain of God." At its base are two boiling wells, where the traders can cook their meat by putting it into the water on their ramrods. It is possible that it is a sulphur cone.

No one can look at a map of East Africa without seeing that to open up the Equatorial Lakes, a way must be made to them through the

Masai country, to avoid both the long journey of the Nile, and the circuitous and expensive route through Unyamwezi. I have talked with the native traders to the Masai, and they consider it quite feasible. In fact, they gave me clear evidence of their belief by offering to go with me if I would make up a party. Kibanga offered me letters of introduction to his friends, the chiefs of Pari, and Chaga; while a Wazegua chief offered to go with me up the valley of the Luvu as far as Chaga.

It would be far better for an intended expedition to Masai to get their men upon the mainland instead of in Zanzibar. There are many friends of mine who know the Masai language, and I shall always be glad to assist an expedition by procuring the right men and obtaining introductions from one native chief to another, which will be found of great value in this part of Africa.

After the reading of the Paper:—

Mr. ALFRED CRAVEN rose and said he had had the pleasure of visiting Magila during Mr. Farler's residence there, and partaking of Mr. Farler's hospitality for some little time. His object was to investigate the zoology of the region and acclimatise himself preparatory to a journey of exploration to the Lake regions; but he was unfortunately overcome by sickness, and forced to return to England. During the time he was there he was impressed by the great natural beauty of the country, which well deserved its name of the "Switzerland of Africa." He believed that every production of the tropics could be grown on its fertile soil. He had no doubt that higher up the mountains the climate was salubrious.

Captain C. E. FOOT, R.N., after alluding to his former acquaintance with Mr. Farler at Zanzibar, said the Paper showed that the friends of Africa might congratulate themselves on the advance that had been made during the last few years. When it was seen that Mr. Farler could live for years among the natives of the interior and enter into friendly relations with them, and even be invited to become their chief, it was evident that there was good material to work upon. He thought that the visit of the Sultan of Zanzibar to this metropolis had been of great service to Eastern Africa and to humanity at large. He (Captain Foot) was the last to say "Good-bye" to his Highness at Aden, when he left that place for England; and he was glad to know from his friends at Zanzibar, that since his return the Sultan had done all he could to promote civilisation and commerce, and suppress the slave trade. Missionaries were much indebted to his Highness for having facilitated their operations in the country. The missionaries were the true pioneers, and it behoved the nation of England to supplement those efforts and assist the Geographical Society in exploring the unknown tracts of the continent.

Sir T. FOWELL BUXTON, at the request of the Chairman, then gave an account of what had been done towards making a road from the coast, near Zanzibar, into the interior. He said: If it had not been for the Chairman's request, it would have been more gratifying to the promoters of the road to have shrouded themselves in a little modest reserve until they had something more to speak about than they had at present. Still they recognised the duty of stating what had been done, if it would tend to encourage others who took an interest in the civilisation of Africa. The origin of the work which had been undertaken dated back to the time of the conference at Brussels, where a discussion took place in reference to the best means of spreading civilised commerce in Africa and suppressing the slave trade. Among the various methods then suggested, none obtained more favour than that of opening a road

to the interior. The idea was taken up by a few who attended the conference, but it was felt that it was a kind of work which did not lie within the purview of the African Committee of the Geographical Society. It was therefore undertaken at first in a very small way, in the hope that a beginning at least might be made. In the first instance it was proposed to make a road from the coast to the north end of Nyassa. So little was then known of the country, that the starting-point was not fixed on until the men employed had reached the place. In the first instance they went to Dar-es-Salaam, just opposite the southern end of the island of Zanzibar; but after a short time the agent then in charge, Sergeant Mayes, proceeded down the coast to ascertain whether the port of Kilwa would offer greater facilities. It was perhaps rather a misfortune that he so decided, because a fine season, which might have been better employed, was thereby lost. However, it was clearly ascertained that Kilwa and another place, Kilwa Kivinji, were utterly unsuitable for any such work. Between the sea and the hard ground there was a broad belt of morass, and the hard ground itself was rock, with a sparse population. Of the two points, Dar-es-Salaam was infinitely the most useful and valuable from which to make a start. It had a well-protected harbour, with a steep shore and deep water, so that ships could approach any landing-place that might be made there. There were two or three good buildings on the coast, and further inland it was well populated. The work of road-making was begun with energy about the middle of last year, and up to the date of the last letters which had been received 40 miles had been completed. Of course that was a mere nothing compared with what it was hoped eventually to accomplish; but at all events some experience had been gained which might be of value to future travellers, traders, or missionaries. It had been proved that the natives were numerous, and were very willing to undertake labour for wages. The wages ranged from three to six dollars a month. There had been difficulties, but on the whole he thought it might be said that the natives had displayed a capacity for labour, whether engaged by the day or by the month. There must, however, be constant supervision. If European supervision were withdrawn they immediately fell into dawdling ways. Another point of some importance was that a very little training and education had taught them to receive their wages in small Indian coin instead of masses of cotton goods. It had always hitherto been the great difficulty with travellers that they had to carry such large supplies of cotton goods, and it would be a very great gain if the natives learnt to accept payment in coin. The extreme rapidity with which vegetation grew up was a great difficulty to overcome, and it might be that nothing would keep it down except the use of wheeled conveyances. It was hoped that the native traffic of foot passengers would have sufficed. There had been no lack of such traffic, for the road had been used to a great extent for the carrying of indiarubber, gum copal, and other produce; but for so many generations the natives had been so accustomed to walk in Indian file, that, however numerous they might be, and however smooth the road, they continued to walk one behind the other. Only one small thread of road was therefore kept open by the traffic. Some little effort had been made to introduce wheeled conveyances drawn by oxen, and it could not be said those experiments had failed owing to the presence of the tsetse fly. Accidents of one kind and another had occurred, and possibly there had been carelessness in dealing with the animals, and nothing definite could be concluded from the attempt which had been made to use oxen or horses as beasts of draught. There was this encouragement, however, that the donkeys which had been employed had done their work efficiently and well, and had kept in good health. The only wheeled conveyance which had proceeded along the road with any success was something akin to a cestermonger's cart drawn by two donkeys, and to add to the sporting effect of the scene they were driven tandem. They had several times gone at a good fair pace along the road. The work had not

gone on as quickly as might have been expected, but the climate had presented one great obstacle. Those who had undertaken the work had been exposed to the severity of the climate more than ordinary travellers, for they had had to work in a somewhat dense jungle where the air was close and damp. The four Europeans who had been employed had all more or less suffered from the climate, and had to return rather quickly. Sergeant Mayes, who was compelled to come home, went back again; but he now wished to give up the work. On his return it was hoped that fuller accounts would be obtainable of what he had been doing; but among the various talents which he had displayed, the art of descriptive writing had not been one. There was no insuperable difficulty in carrying on the work, and in time the Sultan might become so far interested in it as to extend the road for some hundreds of miles. He could not conclude these remarks without mentioning the kind interest shown by the Sultan, and especially by Dr. Kirk, when any little difficulties had arisen. One of the chiefs objected to the road passing through his territory. Stringent directions had been given that there should be no attempt at forcible progress, but the matter having been referred to the Sultan, who claimed authority there, a small police force was sent over, and the objection was overcome without any further difficulty. He believed that in time all such opposition would be overcome, and no hostility would be met with from the natives.

The CHAIRMAN (Sir H. Rawlinson) said Mr. Farler had given a very graphic description of the district of Usambara, and had touched upon other points, regarding some of which the Society would be glad of further information; such as, for instance, the practicability of the route through the Masai country to the Victoria Nyanza. Perhaps he would be good enough to say whether there was anything like a trade route passing by the southern slopes of Kilimanjaro, because that was one line of access to the interior in which the Society had always taken the greatest interest. The African Exploration Fund, which was practically a branch of the Society, would have preferred that for their first exploratory essay; but from the best information they could obtain, they were impressed with the belief that it was absolutely impossible for a traveller to get through the Masai country. If it was possible, he hoped that the African Exploration Fund would make the attempt, because, as matters stood at present, the establishment of as nearly direct a line as possible between the Victoria Nyauza and the coast was the great desideratum for the improvement of Central Africa. While he was referring to this point, he could not help drawing attention to the really invaluable services to the cause of geography which were performed by the various missionary establishments in that part of Africa. Just now those establishments supplied almost the only means of increasing our geographical knowledge of that region. Besides those on the coast of Mombas and Zanzibar, there was a missionary establishment on Victoria Nyanza, which had been doing very good work. There were also some interior posts, and a mission was about to be formed on Tanganyika. In addition to these, there were establishments both at the north and at the south end of Nyassa. The African Exploration Fund had recently sent out a young traveller, Mr. Keith Johnston, who left England on the 14th instant, for the purpose of carrying out an exploratory survey from Dar-es-Salaam to Lake Nyassa. No doubt he would work in perfect accord with the party to whom Sir F. Buxton had referred, and they would mutually assist each other.

Mr. FARLER, in reply, stated that the native traders had no regular route across the Masai country, although some had crossed that district. Quite recently one of the men who escaped the massacre of the missionary party on the Victoria Nyanza, returned across the Masai country alone. He thought it was quite possible for an expedition to pass through, but it would have to proceed with great care. The

Masai people hated and detested the Arabs, and therefore no Arab should be taken with the expedition. The travellers must not attempt to hurry through. They should first of all make their way up the valley of the Luvu, stay a certain time with each chief, and so get introductions from one to another. In this way he thought it was quite possible for a peaceable expedition to cross the Masai country from Usambara.

The CHAIRMAN, in thanking Mr. Farler, wished to add that the gentleman who had been selected for the purpose of making the attempt to cross the Masai country was Mr. Wakefield, of the Ribé Mission, near Mombas. His route would have been far to the north, on the borders of the Galla country; the project, however, was postponed for a time. If the African Exploration Fund became popular, and was duly supplied with the sinews of war, he hoped that it would be resumed, and that they would be able to secure Mr. Wakefield's services.

A Journey through Cyprus in the Autumn of 1878.

By J. THOMSON.

(Read at the Evening Meeting, January 13th, 1879.)

EMBARKING at Alexandria in the Messageries steamer *Arethusa*, after a short and not unpleasant passage we anchor in the roads off Larnaca, on the morning of the 7th September.

Soon after daybreak we descry the shores of Cyprus, fringed with a belt of foam, behind which, and contrasting with the deep blue of the Mediterranean, russet and chocolate-coloured plains extend to the slopes of the southern chain of mountains. The heat is intense, for with the exception of a solitary cap on the summit of Troodos, the Cypriote Olympus, there is not a vestige of cloud to temper the scorching rays of the sun. The morning mist is rising from the valleys, obscuring the great spurs that fall away in dark masses from the central cone of this lofty range. As we approach the shore, details of the panorama come into view, and numerous villages are seen, embowered in foliage, affording an agreeable contrast to the vast expanse of sombre-coloured hills and plains.

Larnaca seen from the roads, with its domes and minarets bathed in sunshine, and its gardens shaded by fig-trees and date-palms, forms one of the most pleasing pictures in the Levant. But a closer inspection of the buildings on the Marina is not so satisfactory. True, the houses, and wreckage of landing-stages and waterside cafés, are most picturesque and rich in the forms and colours that delight the eye of an artist; but the evidences of neglect and decay are most depressing. The city proper lies in a hollow about half a mile inland from the Marina, the two places together having a population of about 8000.

A most interesting feature in the physical geography of this part of the island is the great alteration in the coast-line since the time when Citium was the chief southern port. Larnaca Marina is not only a modern settlement, but the ground on which it is built had apparently

no existence when Citium was the capital of a small kingdom. The town of Larnaca and the intervening space between the settlement and the Marina marks the site of Citium. Here I surveyed mounds of *débris* strewn with fragments of sculptured stone. Some parts of this space have been brought under tillage, but there still exist traces of the pier and retaining walls of the harbour spoken of by Strabo. General di Cesnola observes:—"The ancient coast-line is still marked by a continuous undulating line of rock." This conglomerate rock is the same as that found further inland between Larnaca and Nicosia. It is supposed to have formed at one period an unbroken surface; but at present it is found in isolated hills and knolls, which are year by year reduced by erosion and the detritus carried down to the sea. Add to this the sudden and heavy rains to which the island is subject, and the resulting denudation of the mountains, and we have some clue to the mode in which the new coast-line has been built up. I shall be better able further on to draw your attention to the hydraulic force developed by a single day of rain in the higher altitudes of Troodos. Many of the streams are dry during summer, but become torrents in winter, carrying down to the sea the detritus of the hills. This happens during the season when south-westerly winds prevail, with a sea flowing in upon the southern shore, and there depositing the *débris* contributed by the streams.

After the destruction of the forests on the lower spurs of the mountains, the surface left exposed, and deprived of the roots that bound it together, must have been rapidly broken up. Of this fact I found evidence during my tour through the island. In some places the sites of hills, once clothed with verdure, are marked by groups of isolated rocks, the cores, so to speak, deprived of the soft formations with which they were overlaid.

The modern shore thus formed is made up of sand, fragments of limestone, pebbles, and pieces of conglomerate, and in its general features recalls the coast-land added to the western side of Formosa within the last two centuries. In both places salt lagoons exist, and were formed under similar conditions. These lagoons of Formosa and of Cyprus are turned to account in the manufacture of bay salt, more to the detriment of the health of the islanders than to the increase of the revenue.

To return to the Marina of Larnaca. Although it boasts some interesting buildings, and notably the old church of St. Lazarus, its houses externally have a poor appearance. Stone and sun-dried bricks are the materials employed in the construction of their outer walls, but the lofty and commodious interiors are plastered with lime and coated with talc. The windows are protected by venetian blinds, and have glass shutters opening inwards. These are closed at night, even during the hottest months, to exclude the malaria wafted from the marshes.

Having engaged mules and a muleteer, we commenced our journey through the island. The route from Larnaca to Nicosia lies over a partially tilled plain, in a north-westerly direction, where there are vast tracts of fallow land abutting upon the road. These are covered with a rank growth of gigantic thistles, prickly shrubs, grasses, and wild flowers. Every object around is covered with a thin layer of dove-coloured dust, and it is not long before we ourselves partake of the prevailing hue of the landscape.

The road has been recently repaired, and fitted for an omnibus, which runs daily between Larnaca and Nicosia. Here and there we descry hamlets embowered in fruit-trees, surmounted by the tower of a Greek church; but with the exception of the trees of these village orchards, there is not a vestige of wood to be seen around. For five or six miles the land is uncultivated, and its herbage crisp and dry under foot. It is an undulating desert of brown, relieved at intervals by patches of bright green foliage round its water pools and springs.

We pass the night at the village of Athienu, distant about 13 miles from Larnaca. It is the head-quarters of the muleteers of Cyprus, who claim descent from the Lusignans. The men of Athienu are a fine, tall, broad-shouldered race, and many of them have flaxen hair and clear blue eyes. My muleteer introduces me to an aged relative, at whose house we pass the night. The village abodes are composed of mingled mud and stone, and are roofed over with clay. The unclouded moon reveals the villagers reposing on the flat roofs of their dwellings, or in the courts below.

I must not omit to pay a just tribute to the hospitality of these simple people, who place at one's disposal the best of everything their houses can provide. It is a point of honour with them to welcome the stranger within their gates; nor do they seek for reward or make comment on the gifts bestowed on their children or dependents.

Athienu is a perfect oasis in a desert, for it lies in a well-watered hollow surrounded by gardens and vineyards. About 4 miles further on, we cross over a stone bridge which spans the River Idalia, whose bed is almost dry at this season.

That part of the Mesoreia Plain which borders the capital is fairly well cultivated, and totally devoid of timber, the entire plain lying between the mountains having been at some period of its history brought under tillage. It is fertilised by the annual overflow of the Pedæus, Idalia, and other streams; and the luxuriant growth of its cereals has won for Cyprus the name of the granary of the Levant.

From a hill about 2 miles south-east of Nicosia we obtain a view of the city, surrounded by its Venetian fortifications built in 1570. From this point the town looks most picturesque and attractive. Within its walls rise towers, minarets, stately palms, and the massive pile of the old cathedral of St. Sophia, which was first mutilated by the Turks and

afterwards transformed into a mosque. Mingling with the wayfarers is a troop of lepers, who live in tombs hard by. But many bright faces and stalwart forms are seen, owners of caravans making their way to the capital as we enter by the "Channel Squadron" Gate. Ascending to the ramparts, we see spread out before us a vast acreage of mud cabins nearly buried in orchards. Towering above the modest abodes of the citizens are a number of mutilated churches, and edifices whose massive proportions and mediæval architecture carry us back to the time of the Lusignan kings. An ancient aqueduct supplies the town with water from the hills.

Leaving the capital, we strike across the plain northward to Kerynia, crossing the Pedæus about 2 miles from the town. This fertiliser of Mesorea has dwindled to a mere rivulet. Pushing on to the base of the northern mountains, and ascending the lower spurs of the chain, we find the dry beds of torrents littered with angular fragments of limestone recently brought down from the hills. Many of the slopes are also covered with splintered rocks, some of which, carried down by the last rains, form a barrier across the bridle-path. But there are many well-watered alluvial valleys whose pasturage affords food to vast herds of goats and flocks of sheep. Fringing the streams are evergreens, myrtles, oleanders, and tall plumed grasses.

From the summit of the range we see spread out before us the verdant plain of Kerynia, intersected by streams, and guarded by the old fortress. Beyond is the blue expanse of the Mediterranean, and on the northern horizon we descry the faint outlines of the coast of Asia Minor.

On a richly wooded height about 6 miles south-east of the port of Kerynia stands the Latin monastery of Belle Paix, founded by Hugh III. The road across the plain to this retreat lies through an unbroken belt of gardens and cultivated fields, and is overarched by brambles, myrtles, oleanders, dog-roses, and fig-trees. In spring time the banks of the streams are covered with wild flowers.

Having engaged at Kerynia, as dragoman, an Arab named Habib Kuri, I continued my journey westward, along the shore to Lapithus. Hard by the monastery of Akheropiti, I photograph an ancient rock-cut temple or tomb (mentioned by Pocock), and between the sods of a ploughed field discover the remains of a fine mosaic pavement. Striking into the mountains through a district abounding in olive and mulberry plantations, and crossing a cotton field where women are picking the ripe pods, we enter a glen at the extremity of the northern chain. The hills are here clothed with a thick growth of shrubs, affording cover to game. Bevvies of partridges rise on all sides as we make our way through the defile.

The monastery of St. Panteleimoni is our next halting-place, where the Archimandrite and monks show us great attention. Following a path through the hills and across a table-land considerably above sea-

level, we next descend to the Morfu Plain. It is one of the most fertile grain-growing plains in the island. Maddar is a product of this district. It was believed by the ancients that the wool of flocks feeding on the roots of this plant became red. But I saw no red sheep at Morfu, although I believe that their bones are tinged with madder.

The town of Morfu has an ancient Greek church, dedicated to St. Manus, and a population of about 3000. The Greek and Latin churches and monasteries, in the absence of inns, are the recognised rest-houses throughout the island. From Morfu we cross the plain to Levka, a village on one of the lower spurs of the southern mountains, and about 6 miles inland from the ruins of Soli. It is a small settlement on the slope of a hill, approached by a valley through which flows a stream of clear water, and is altogether one of the most beautiful spots in the island. Its houses are partly hidden among the foliage of fruit-trees; its orchards yield peaches, oranges, limes, and pomegranates; nor does the store of grapes, figs, walnuts, pears, and apples fail. Perched among the rocks are primitive water-mills, whose ducts span the chasms, and are decked with ferns and gourds. In this district I found extensive mounds of copper slag, marking the site of ancient mines where the ore had been reduced in great quantities.

Following a stream which has a local name at almost every hamlet, we enter a region of vineyards and pine woods. At Kalopaiogatisa the hills are entirely taken up with the culture of the vine, while the village itself, seen from a distance, appears to be a continuation of the system of terracing adopted on both sides of the valley. The houses are flat-roofed, and partly burrowed into the hills.

The manufacture of wine is the chief industry pursued by the villagers, of whom there are about a hundred families. Grapes of fine quality are sold here at a trifle under a farthing a pound. Wine likewise is cheap and potent, and although plentiful, the people are exceedingly temperate in their habits. Lithgow described Cyprus wine two centuries ago as "unpleasant to liquorish lips." It is unpalatable owing to its tarry flavour, contracted from the pitch-coated jars in which it is stored. But it is nevertheless a pure, strong, unadulterated grape wine, which under skilful treatment might be turned to most profitable account.

Ascending the stream to its source, we at last reach Prodomos, a village at an altitude of about 5000 feet, and our starting-point for the summit of Olympus. We have made the ascent, so far, through pine forests, where thousands of trees have been recently cut down. Upon inquiring why so much timber is left to rot on the ground, I am informed that the trees were exhausted and fell of their own accord, and that their owners had no immediate use for them. Women, in this land of Aphrodite, are the pioneers in the destruction of the forests. They may be seen mounting the highest trees, and lopping off the branches

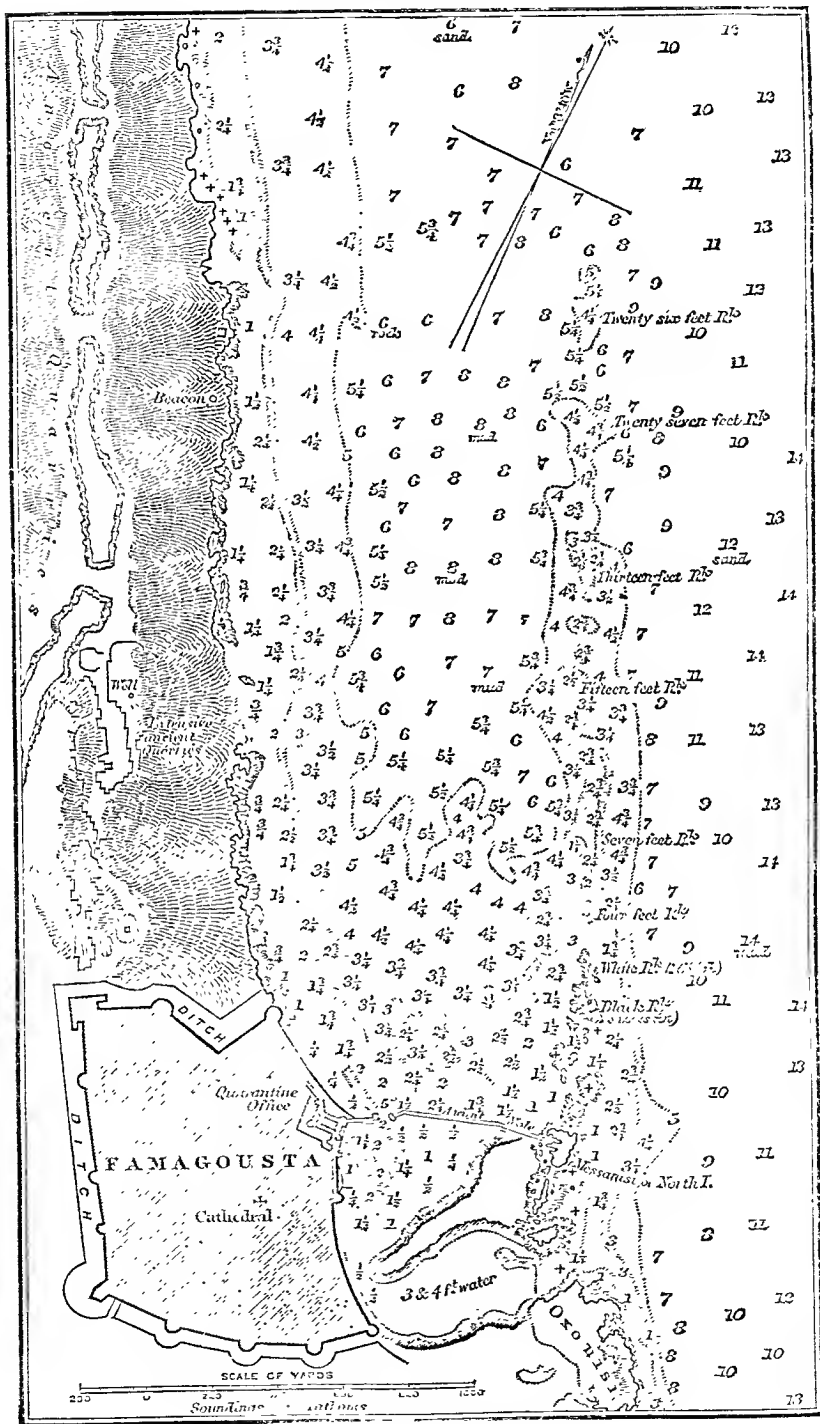
as they go. These they use for fuel; while to the men falls the task of destroying the timber for its resin and pitch.

Starting early in the morning, and making our way through a dark cloud, which enveloped the village like a water-charged sponge, we reach the summit of Olympus after a three hours' ride. Dismounting from our mules, and clambering up a cone covered with fragments of serpentine and other stones, we at last stand on the apex of the southern mountains, at an altitude of about 6300 feet above the sea. Here the storm, which has been brewing, bursts upon us with great violence. Vivid lightning is instantly followed by thunder, which makes the mountains tremble beneath our feet. Then comes a deluge of rain and hail, which continues for some hours; but a lull in the storm enables us to secure a single photograph. The clouds lift for a moment, revealing a scene of weird grandeur. Radiating from this central cone, we behold gigantic buttresses of plutonic rock. Far down beneath our feet, clouds in grey masses hang over the ravines, pierced here and there by dark crags and pine-tops. Nearer at hand, streaks of mist are trailing upward to the summit, while all around us the air resounds with the sharp clatter of thunder and the tumult of rushing waters.

Leaving the party to follow on, I determine to make the descent on foot, accompanied by an armed guide. It is a foolhardy resolve; for, quitting the more compact ground of the forests, I experience the greatest difficulty in finding foothold among the rocky *débris*. Every fissure and channel has been forced by nature into service for the drainage of the heights. Innumerable torrents, charged with their burden of stones and soil, are leaping and rumbling downwards. Worst of all, we find the villago road in "spate," invaded by a broad turbid stream, running with the force of a mill-sludge. My shoes had given way, and we enter Prodromos in a most dilapidated condition.

Following one of the streams which fall into the sea near Paphos, I found numerous examples of the wreckage caused by the storm in Olympus. The river had swollen to a torrent. Landslips had occurred in the defiles, in one instance carrying away the bridle-path, and compelling us to ford the torrent at a dozen different points. Here and there, roots of trees were lying embedded in sandbanks; but the channel of the river generally consisted of angular blocks and fragments of limestone. The banks were likewise encumbered with stony *débris*, in some places of dazzling whiteness, reflecting the heat of the sun's rays with such force as to render the atmosphere almost stifling. At the mouth of the river we observed a great semicircle of turbid red water impinging upon the blue of the sea—the edge of a different hue, recalling a rainbow—where the fresh and salt water were uniting.

After calling at Paphos, and photographing some of its antiquities, we cross to Limasol, over hills bordering the sea, where a number of fine olive plantations have been neglected and abandoned. Touching at Curium and Limasol, the most prosperous-looking port in Cyprus, we



PLAN OF FAMAGOUSTA HARBOUR.

push on to Larnaca, and thence to the famous city of Famagousta. I will not enter into a detailed account of this splendid ruined city, as it has been frequently described. I will only say that a personal inspection of the harbour, as well as of the Admiralty charts, and soundings made in August last by Mr. Bingham, led me to the conclusion that Famagousta is naturally fitted for the construction of a spacious haven, and that the natural advantages of the position would materially lessen the cost of construction of suitable harbour works. The once famous harbour has been allowed to silt up, and now only affords shelter for small vessels. Beyond the port there was at one time an ancient breakwater, joined to a reef of rocks. These partially submerged rocks are continued northwards by a spit over a mile in length, and covered by from 2 to 4 fathoms of water; and between the rocks and the mainland is a channel of about a quarter of a mile wide and 7 fathoms deep. The bottom of the old basin is composed of sand and clay, the alluvial deposit probably brought down by the River Pedæus. This deposit has so accumulated at the lower section of the basin, that it is only covered by about 3 feet of water. This may be accounted for by the destruction of the sea-wall, which at one period probably united the rocks, and by the action of the winter waves tossing over *débris* into this comparatively still water. Abundance of material is to be found in the ruins of Famagousta and neighbouring hills for the manufacture of concrete blocks for repairing the old sea-wall, or for the construction of a spacious harbour on the foundations which nature has provided.

On the conclusion of the Paper, the Chairman (Sir H. Rawlinson) called upon

Captain F. J. EVANS (Hydrographer to the Admiralty), who rose and said that when he visited Cyprus last autumn he had not the good fortune, like Mr. Thomson, to make a tour through the interior of the island, but he had perhaps seen as much of its outside as Mr. Thomson had of the inside, and he could only say that the landscapes were in many parts as genial and beautiful on the coast as those which the Paper had described inland. The principal object of his own visit was, of course, a professional one, in relation to harbours. Larnaca and Limasol, the commercial centres, were open roadsteads, but the harbour of Famagousta had a very interesting bearing on the future of Cyprus from both a military and a naval point of view. From the Middle Ages Famagousta had been the military and naval port of the island, and it was not until one had visited and realised the extent of its fortifications, the splendour of its churches, the money and labour that had been bestowed upon it, that the value attached to this city during the Middle Ages could be understood; and as history ran very much in parallel lines, it might be expected that Famagousta would hereafter be of great importance if the need should arise. In those times an immense fortress was erected on the margin of a large plain, one side of the walls facing the sea. Those walls were nearly 2 miles in circuit, some 20 feet thick, and from 40 to 50 feet high, being surrounded by a ditch 80 feet wide and 25 feet deep. The town in its palmy days, it is said, had a population of 30,000.* It was

* The population of Famagousta in 1878 amounted to 500 in all, composed entirely of Mussulmans. The city is now one vast ruin.

well drained, and had water running through its streets. A solid masonry mole 1400 feet long enclosed a large water area, where ships lay immediately under the walls of the city. This port from many causes had silted up, one of the main causes being the sewage and rubbish of the city: probably, too, there had been disintegration of the banks, which the sea had washed in; at the present time there was only room for a few vessels drawing 8 or 10 feet of water. It was doubtful whether this ancient port could be profitably cleared out, in consequence of the immense amount of abominable filth in it. But whether this be effected or not, nature had been particularly bountiful to the neighbourhood, for, as described by Mr. Thomson, there was a long spit or reef which ran out for a mile with shallow water on it, between this and the mainland there was a deep gully of 7 or 8 fathoms, which gradually shallowed up to where the port was formed. It would require a very small amount of stone and labour, compared with harbour works in this country, or in the Mediterranean, such as at Marseilles, or Genoa, or Alexandria, to make this area a port that would be suitable for a small fleet of large ships. Even at present some six or eight steam vessels of moderate size could lie in shelter under the dry and shallowest part of the reef. Therefore if the time ever came when Famagousta should be called upon to play a part similar to that which it did in the Middle Ages, as a great fortress of the Mediterranean, all the conditions were present for adapting it to the circumstances of modern warfare. Famagousta must be regarded as a very remarkable place not only in the past, but also in the present, and probably in the future.

DR. PHÉNÉ said that the conglomerate to which Mr. Thomson's paper had referred was a common feature on the coast of Caramania. It was found also in the Gulf of Corinth, and formed to a very great extent the material of which the Treasury of Atreus and other buildings at Mycenæ were constructed. On the map suspended before the Meeting "*Paphos*" was marked under a little promontory, but he fancied that must be *Neo Paphos*. Paphos proper was considerably to the south-east of that point. Those who were acquainted with the maritime features of the coast of Cyprus knew that there was no good anchorage south-east of Neo Paphos for a considerable distance, and it was because Neo Paphos afforded a better harbourage that it became the place to which the ancient visitants to the island directed their steps when they wished to approach the sacred district of Paphos itself. The whole area between Neo Paphos and Paphos was classical land, and of great mythological interest. The attention of the Meeting had been called by the very important information given by Captain Evans, to Famagousta, but one of the chief points for consideration was the sanitary condition of the island, and the selection of a position for a camp, or for the residence of those who were connected with trade, and had to live in the interior. He thought that it would be found that the Turks in olden times had rightly retained Nicosia as the capital. It appeared to have been selected as early as the time of Richard I. It was in the locality where there were large fields of grain, and which from good cultivation was free to a considerable extent from malaria and fever. Lieut.-Colonel White, commanding the Royal Scots at Larnaca, had lately solicited the British Association to apply to him (Dr. Phéné) for information on this sanitary question. That request had not yet been complied with, as it was hardly prudent to give an opinion without examining what had already been done, and in face of the able authorities now in Cyprus. He hoped to be going soon to make such an examination in person; meanwhile he felt sure that Nicosia was one of the most healthy localities on the island, and that a railroad only was necessary to make it what Bournabat is to Smyrna.

Rough Notes on Pre-historic Cyprus.

By Major-Gen. Sir H. C. RAWLINSON, K.C.B.

(Read at the Evening Meeting, January 13th, 1879.)

THERE appear to have been four distinct phases of colonisation in Cyprus. The primitive colonists were the Kittim and Dodanim of Scripture, who in the earliest ethnological table that we possess, that preserved in the tenth chapter of Genesis, and named by the Hebrews "Toldoth Beni Noah," or "Genealogy of the Sons of Noah," are classed with Elishah and Tarshish as the sons of Javan, a name applying to the country afterwards inhabited by the Aryan Greeks. These races were probably all of the Altaic or Turanian family—indeed, at the early period of the world's history to which the tenth chapter of Genesis refers, there were no Aryans or Semites as far west as the Mediterranean—and emigrated westward from the coasts of Asia Minor and Syria. Elishah is supposed to have peopled the Peloponnesus. Tarshish has been a fruitful subject of dispute amongst Biblical scholars, the name having been doubtfully compared, sometimes with Tarsus of Cilicia, sometimes with Tartessus of Spain, though it has been admitted to represent generally the Mediterranean Sea. I venture to suggest an explanation of the name which has not as far as I know been given before, namely, that Tarshish is the reduplicate form of *Tarsh*, for which we have abundant authority in the early geography of Western Asia, as in the optional use of such terms as Libanus and Lebanon, Azotus and Ashdod, Yavan and Yuman, and, as I shall presently show, Yadan and Yadnan. *Tarsh*, then, as the primitive form of the name, will represent the *Etruscans* of later history, and especially the *Tyrseian* or Tyrrhenian Sea, which was an early name for the eastern part of the Mediterranean. It remains to consider Kittim and Dodanim. These races I believe to have first colonised Cyprus and then to have passed on to Latium and Magna-Græcia. The Kittim at any rate were recognised by Josephus and by the Jews generally as the first settlers in Cyprus and the founders of the capital of Citium, though in the later prophetic books, and especially in Daniel, the name of Kittim or Chittim has been more generally supposed to indicate the Romans or Macedonians.

In one early passage, however, I would suggest that there possibly may be after all an allusion to Cyprus, rather than to Italy or Greece. I refer to the famous prophecy of Balaam, where we read in our version, "And ships shall come from Chittim, and shall afflict Asshur, and shall afflict Eber, and he shall perish for ever" (Numbers xxiv. 24). There is some diversity of rendering the Hebrew text in the different translations of the Bible, but the general sense is the same in all that danger shall come on Asshur and Eber from Kittim. Now, in the fifteenth century B.C., which is the date usually assigned to Balak and Balaam, we can hardly

suppose a reference to the after migrations of the Kittim, so as to make the prophecy applicable to Rome or Macedon. The Chittim of Numbers is almost certainly the Kittim of Genesis (the Hebrew orthography being the same in both passages), that is, the Island of Cyprus. Asshur and Eber moreover indicate broadly the valleys of the Tigris and Euphrates, Asshur being the modern Assyria, and Eber (or rather *Ibr*) being the special name, according to the Arab geographers, of the country along the bank of the Euphrates, including Ur of the Chaldees, on which account Abraham was called "Ibri" or the Hebrew.

It thus appears that there is a prophecy unfulfilled up to the present time which foreshadows danger to the Mesopotamian valley from the power holding the Island of Cyprus.

I can only say, as a friend of the Turks, and an anti-annexationist, "Absit omen."

The name of Dodanim which is bracketed with that of Kittim in Genesis, and which by some of the commentators has been understood as applying to the same people, has never been at all satisfactorily explained under the form in which it appears in our version, though with an initial *r* (the *r* and *d* being hardly distinguishable in Hebrew) it has by Bochart, Michaelis and others been compared with Rhodes, the Rhone, and other Mediterranean names. The explanation which I propose to give, retains the received orthography, and at the same time identifies the name with that of the primitive colonists of Cyprus, who probably accompanied the Kittim in their earliest migrations. We learn from the Assyrian inscriptions that in very early times the inhabitants of Western Asia were classed in two great divisions, "the highlanders" and "the lowlanders," this physical distribution being preferred to the ethnic or linguistic distinction of later ages. The highlanders, whose original seats were in the Taurus, Ararat, and Zagros, represented the eastern half of this region including Assyria and Babylonia. The lowlanders, whose original seats were on the sea-coast, represented the western half of the region or Syria proper. Each division had many names, referring in almost every case to the distinctions of "hill" and "plain." Thus the highlanders (whose usual name was Akkad for Ankad, the same term as the Arabic *Nejd* or "highland") were represented ideographically in cuneiform characters by two heads; the lowlanders by two feet. The highlanders had the name of *Tilla* (from *ala* "to be high"), the lowlanders were called *Tidan* (from *dun* or *adan*, "to be low"). This name of *Tidan* then, applies in the inscriptions specifically to the low country of Syria (otherwise called *Akhari* or western), and is, I believe, the same title as Dedan, which is applied in Scripture to several Syrian and Arabian races, and which is the true form of the Dodanim of Genesis. I may add that the initial dental (*t* and *d* being hardly distinguishable either in Cypriote or in the oldest cuneiform) which forms *Tidan* or *Dedan* from the root

adan, is a preformative well known in all Semitic languages. The probability having been thus shown, that Dedan, or Tidan, was the local name of the Syrian lowlanders, their migration to Cyprus is further illustrated by our finding that *Yadnan*, which is a cognate form with Dedan, is the name applied to the island throughout all Assyrian history. *Yadnan* is the reduplicate form of *Yadan*, as Lebanon is of Libanus, and that *Yadan* (under its Hebrew form of *vadan*, the *vav* and *yod* being constantly commuted) was used by the later Jews for Cyprus, is further shown by a text in Ezekiel which has been wrongly translated in most versions up to the present time. In the famous prophecy against Tyre (Ezek. xxvii. 19) our version reads, "Dan also and Javan going to and fro in thy fairs;" but the verse certainly ought to be translated, "Vadan and Javan," that is, Cyprus and Greece, no other single name in the list being preceded by the copulative conjunction. I will only add that the Greek "Danaus" very possibly represents the same lowlanders, whether the colony proceeded from Lower Egypt or from the coast of Syria, as the kindred immigration of Cadmus (*Kadmi*, the Eastern) certainly proceeded from the same quarter.

The second colonisation of Cyprus I suppose to have been Phœnician, and to have taken place shortly after the settlement of that people on the sea-coast of Syria, which may be roughly stated at about B.C. 2000.

The third immigration was that of the Cypriotes proper; that is, of the people who introduced the alphabet and language known to us by the Cypriote inscriptions, and who founded that school of art to which belong most of the statues and sculptures that have been excavated from the ruins of cities and temples in various parts of the island. This people is proved by the evidence of the language of the inscriptions, to have been cognate with the Carians and Lycians and other Pelasgian races who inhabited the western part of Asia Minor before the Hellenes settled in Greece. They probably occupied Cyprus and pretty well absorbed the Phœnician element, between 2000 and 1500 B.C.

I should not suppose that the Greeks proper who formed the fourth immigration, settled in Cyprus before the eighth century B.C., but they must have soon obtained a dominant position in the island, as we find that most of the kings of the island in the seventh century B.C. bore unmistakable Greek names.

The connection of Babylonia with Cyprus in very early times has been long suspected, but has only recently been investigated in a scholarly manner, by Mr. Boscawen, formerly of the British Museum.

A king of Babylonia, the elder Sargon, who must have lived at least as early as the seventeenth century B.C., certainly conquered Syria, and embarked on the Mediterranean Sea. His actual capture of Cyprus is not mentioned, as far as our present materials extend; but as his son Naramsin was deified in the island, and 1000 years later the second Sargon visited Cyprus and set up his image at Citium, in imitation apparently

of his ancestor and namesake's feat, it may be assumed with much probability; but this visit or conquest would have been long before the Greeks had any acquaintance with the island, and it is not surprising therefore that it should have left no trace in Grecian mythology or tradition.

The second Sargon's visit to Cyprus at the end of the eighth century B.C., is undoubted; a monolith with his image and a record of his titles having been found at Larnaca, the ancient Citium, and being now in the Berlin Museum. At that period the island was ruled over by seven kings, who are stated to be of the race of Yahnag, which may possibly represent the Inachus of the Greeks, the reputed father of Pelasgus, as I have already shown that the true Cypriotes were of the Pelasgian rather than of the Hellenic race.

A century later we find in the cuneiform inscriptions a list of ten kings of Cyprus who were tributary to Assyria and sent artificers to assist in decorating the temples and palaces of Nineveh; and as these kings mostly possess pure Greek names, I infer that at this period of history, that is, in the middle of the seventh century B.C., the sovereignty of the island had been transferred from the Pelasgian *Yahnagi*, or Inachides, to the Hellenic Greeks. These names, which I discovered and published more than twenty years ago in my brother's translation of Herodotus, are as follows:—

Ægistus of Idalium; Pythagoras of Kidrus; Kindes (?) of Salamis; Etuander of Paphos; Erihus of Soloe; Damastes of Curium; Adamisus of Tamissus; Damus of Ammochosta; Anaxagoras of Lidinum; and Puzus of Aphrodisia.

There are two or three matters worthy of remark in this enumeration of names. Firstly, the capital Citium is not included. Taking note of this and remembering that Citium was always called by the Greeks a Phœnician city, we may infer that up to the seventh century B.C. it had preserved its independence of the Greek confederacy, and did not follow the lead of the Greek kings in submitting to Assyria. Secondly, there are two cities which do not admit at present of identification, namely, Kidrus and Lidinum; and thirdly, we have here the true etymology of the modern Famagousta; the Assyrian title is *Anta Khadasta*, "the holy lady," in allusion, no doubt, to the "great goddess," the "Syria Dea," who was worshipped on this spot. This Semitic compound was abbreviated by the Greeks into Ammochosta, and explained by a spurious Greek etymology as a "sandbank." The modern form of Famagousta is due to an initial digamma, which is commonly found in the Cypriote inscriptions, and has nothing whatever to do with "Fama Augusti," as has been sometimes supposed.

Having now reached the historic period of Cyprus, my rough notes terminate.

The Upper Basin of the Kabul River.

By C. R. MARKHAM, C.B., F.R.S., Secretary R.G.S.

Map, p. 160.

IN the number of the 'Proceedings' for January, the geography of the Sulimani mountain system was described, including the lateral Safid-Koh Range, and its offshoots to the right bank of the Kabul River. This system forms the eastern boundary of Afghanistan. It is now proposed to discuss the geography of the basins of the Upper Kabul, of the Ghazni, and of the Helmund rivers, with their bounding ranges, which, with the Sulimanis, include the whole region inhabited by the Afghan race.* The present paper will be confined to a study of the Upper Basin of the River of Kabul; and the Ghazni and Helmund basins will form the subject of a paper in the next number.

The Upper Kabul Basin is bounded on the north by the Hindu Kush Mountains; on the west by the Paghman Range and the Allah-Koh Ridge which connects the Hindu Kush and the Safid-Koh; on the south by the Safid-Koh, and the Karkacha Hills; on the south-east by the range separating Bajaur and Panjkora from the Kunar Valley, called the Lahori Mountains; and on the east by the same range up to the Darkot Pass, where it connects with the Karakoram Mountains. Within this mountain-girt region all the drainage converges to the Kabul River, which carries it to the Indus.

The great feature of the region is the range of the Hindu Kush Mountains, with its spurs and valleys down which the rivers find their way to the Kabul. This lofty mass commences at the south-west corner of the Pamir table-land, and ends where the Koh-i-Baba and Paghman mountains branch to the south-west and south, and the "stony girdle" becomes known under other names; a distance of 300 miles. Its peaks attain a height of 20,000 feet above the sea; and, as Colonel Yule has pointed out, it is a very distinctly defined chain, with the line of loftiest peaks coinciding with the line of *kotuls* or passes. It forms the water-parting of the Indus and the Oxus, and is thus the crest or parapet of the Indian fortress in this direction; the northern slopes of Kunduz and Badakshan forming the glacis, and the River Oxus the wet ditch. The mountains are generally bare of trees, and Wood remarks that what most forcibly strikes a traveller is the nakedness of the country. To the south they have the lofty uplands of the Kohistan and Kafirstan, while on their northern sides are the much lower swampy flats of Turkistan. Hence, the line of perpetual snow, which is affected by a great variety of causes, is much lower on the northern than on the southern face.

* Except the Yusufzai Afghans, who occupy a portion of the basin of the Indus north of Peshawar, which will not be treated of in these papers; and some of the Kakars and Tarins who live to the south of the Khojah-Amran Mountains.

In the present paper I am only treating of the southern watershed of the Hindu Kush, which may be divided into three distinct sections, each occupying about one-third of the whole length of the range. The first, from the east, is the Kashkar or Chitral country, where the lofty passes lead from the Chitral Valley to the elevated plateau of Wakhan. The second, or central, is Kafiristan, and is entirely unknown to Europeans except by report. In these two sections the streams flow from the Hindu Kush into the Kunar River, which drains a long lateral valley for 300 miles. The third or western section is that of the Kohistan of Kabul, where the streams unite to form the Kabul River, and the lowest depression of the region is at the point where the Kabul and Kunar rivers unite.

In the first or most eastern section of the Hindu Kush there are six passes, leading from the Chitral Valley into Wakhan. As the valleys on either side are at great elevations, the ascents to the crests of the passes are not considerable. In fact, the Hindu Kush is here a ridge, branching gradually from the lofty table-land of Pamir. The Baroghil Pass, which leads from the Mastuj stream, the name applied to the upper portion of the Kunar, to Sarhadd, within the Upper Oxus Basin, is an easy route across an elevated table-land. There is a gentle ascent of a mile and a half to a camping-ground; another ascent of a mile, the first half of which is steep, and the level Dasht-i-Baroghil is then reached. This is the water-parting between the head waters of the Oxus and of the Kunar, a feeder of the Indus. The road traverses the Dasht-i-Baroghil for about 5 miles, with low hills on either side, then descends for 2 miles, and meets, at the foot of the slope, a small stream flowing to the Sarhadd, a feeder of the Oxus. The height of the Dasht-i-Baroghil is estimated at 12,000 feet. In summer it is covered with rich pasture, and is a favourite grazing-ground for the cattle from the Wakhan Valley, on the Oxus side; but it is closed by the snow for more than half the year. It was crossed by the Mullah, one of the native explorers employed by Colonel Montgomerie, in May, 1874.

The Baroghil Pass is on the north side of the upper extreme of the Chitral (Kunar) Valley. On the east and south sides are the mountains which separate it from Yasin, and continue to form its south-eastern limit. These mountains, being a spur from the Karakoram Range, contain peaks rising to 21,000 and 22,000 feet above the sea.

The Baroghil is the lowest pass in this eastern section of the Hindu Kush. There are five others, called Ishtirak, Agram, Nuksan, Khartaza, and Dora. The Ishtirak and Agram passes are covered with perpetual snow, and are impracticable for loaded animals. The Nuksan was crossed by the Havildar, a native explorer employed by Colonel Montgomerie, in September, 1870. The ascent was very fatiguing, as the road was covered with snow nearly from the foot of the mountain.

The slope is steep, and on the crest there are large beds of snow, and immense masses of ice. For 500 paces the road appears as though cut through the ice to a depth of from 6 to 12 feet, and at intervals there are wide crevasses. It is evident that glaciers exist on this section of the Hindu Kush. After September the Nuksan Pass is closed. The next one is called Khartaza, and the last to the westward, in this Chitral section of the chain, is the Dora Pass. The native explorer crossed the latter on the 6th of November, when it was snowing hard with a piercing wind. But the Dora is, on the whole, easier than the Nuksan Pass. The latter is believed to be about 17,000, and the former 16,500 feet above the level of the sea.

The Kunar River flows down a valley which is parallel with the line of the Hindu Kush, receiving all the drainage of its southern slopes on the right bank, and that of the Lahori Mountains on the left. The latter range has been so named from the Pass of Lahori, by which the road from Dir to Chitral crosses it. Where the range commences at the great mountain knot whence radiate the Karakoram, the Hindu Kush, and the Lahori, the latter has peaks 22,500 feet in height. The Lahori Range extends to the Kabul River, with the Kunar flowing along its western base, and it gradually decreases in elevation. Opposite to Chitral its peaks reach to 18,900 feet, near Chigar-serai* to 10,000, then to 8000, and where its last spur overhangs the Kabul River, the elevation is only 5000 feet.

The valley of the Kunar has only been partially explored. The upper part is occupied by the Muhammadan state of Kashkar. or Chitral, the town of about 600 houses being on the banks of the river, and the king living in a fort close by.

Here the winter is severe, the snow continually covering the ground from November to March. All the passes are closed for traffic during this season, and trade is only carried on from July to September. Goods are carried on mules, ponies, and donkeys, the exports being wool, cloths, orpiment, and hawks, and the imports, salt, muslin, cloths, firearms, and cutlery. With Badakshan slaves are exchanged for horses and money. Apples, plums, mulberries, and apricots are grown, and crops of wheat and barley are raised, the soil being good. The valley also contains a good deal of jungle wood, but there are very few timber-trees.

The course of the river has been explored from the Baroghil Pass to a place below Chitral, called Mirkandi, where the road over the Lahori Pass comes down into the valley. But from that point to Asmar, a distance of 50 miles, the valley of the Kunar is still entirely unknown. In this unexplored gap the path is said to be along the banks of the river; horses can travel over it with difficulty, and it is probably altogether impracticable for baggage animals. Merchants never use

* Chagân-serai ("the white serai") of Baber.

this road in the valley, but always take the circuitous route over the mountains to Dír, and down again by the Lahori Pass.

The hills enclosing the Kunar Valley are generally stony, but more or less covered with grass, affording good pasturage, and patches of cultivation occur low down. About and above Asmar there are fine pine-trees, especially up the tributary valleys, and much timber is floated down to Peshawur. Asmar forms an independent State, and the dominion of the Amir of Afghanistan commences at Maraora, the frontier village of the Jalalabad province, 20 miles lower down. At the village of Chigar-serai, 12 miles below Maraora, the river which drains the Kafiristan region falls into the Kunar on its right bank, and thence to the point where the Kunar (or Kawah) falls into the Kabul River is a distance of 97 miles. The whole length of the course of the Kunar is 320 miles.

The central or Kafiristan section of the Hindu Kush extends for a distance of 80 miles, and is entirely unknown. Doubtless there are passes over the mountains into Badakshan,* but the region has never been explored by any European. The chief river of Kafiristan is that which falls into the Kunar at Chigar-serai. This river appears, from the narrative of the Mullah, to be called the Pich,† and he says that it has an affluent called the Kattar, after a town of that name inhabited by Kafirs. Masson tells us that the northern part of Kafiristan is called Kattar; and the Chief of Chitral, whose subjects seem to be allied to the Kafirs, still has the title of "Shah-Katawar." The country drained by the rivers Kao and Alishang, which flow from the Hindu Kush for 60 miles parallel to each other, and after uniting to form the Alingar, fall into the Kabul River 30 miles above the mouth of the Kunar, is also part of Kafiristan. Formerly the Kafirs extended still further west, taking in the Nijrao and Tagao valleys.

This unknown portion of the southern watershed of the Hindu Kush is inhabited by an indomitable race of unconquered hillmen, called by their Muslim neighbours the Siah-posh (black-clothed) Kafirs. Their country consists of the long valleys extending from the Hindu Kush to the Kunar River, with many secluded glens descending to them, and intervening hills affording pasturage for their sheep and cattle. The peaks in Kafiristan reach to heights of from 11,000 to 16,000 feet. The valleys yield crops of wheat and barley, and the Emperor Baber mentions the strong and heady wine made by the Kafirs which he got when he extended his dominion to Chigar-serai in 1514. The Kafirs are described as strong, athletic men, with a language of their own, the

* The Kafirs certainly frequent the northern slopes, as we gather from Wood's narrative.

† Baber also mentions the "Kafirs of Pich." The lower part of this valley, and that called Tagao, is inhabited by a tribe known as *Safis*, who are Muhammadans, and probably converted Kafirs. In Baber's time the inhabitants of the Tagao Valley were Kafirs.

features and complexions of Europeans, and fond of dancing, hunting, and drinking. They also play at leap-frog, shake hands as Englishmen, and cannot sit cross-legged on the ground. When a deputation of Kafirs came to Sir William Macnaghten at Jalalabad, the Afghans exclaimed—"Here are your relations coming!"

From the days of Alexander the Great the Siah-posh Kafirs have never been conquered, and they have never embraced Islam. They successfully resisted the attacks of Mahmud of Ghazni, and the campaign which Timur undertook against them in 1398 was equally unsuccessful. But the Muslim rulers of Kabul continued to make inroads into the Siah-posh country down to the time of Baber and afterwards. Our only knowledge of this interesting people is from the reports of Muhammadans, and from an account of two native missionaries who penetrated into Kafiristan in 1865.* Elphinstone obtained much information respecting the Kafirs from one Mullah Najib in 1809; and Lumsden from a Kafir slave named Feramorz, who was a general in the Afghan service, in 1857. Further particulars will be found in the writings of Burnes, Wood, Masson, Raverty, Griffith,† and Mohun Lal.‡

The western section of the Hindu Kush rises from the Kohistan of Kabul, and extends from Kafiristan to the point where the Koh-i-Baba and Paghman ranges branch off. This section is the Indian Caucasus of the historians of Alexander's campaigns. The Hindus derive the name of Hindu Kush from the tradition that a giant used to lie there in wait to kill (*kesh*) all the Hindus who passed that way.§ This giant was probably the same whom we, in the Arctic Regions, used to call "Old Zero," better known in England as "Jack Frost." The horrors of the snow-covered wastes probably gave rise to the tradition.

The following passes traverse this western section of the Hindu Kush from east to west, namely, Anjumán, Khawak and Thal, Zarya, Yatumak, Unraz, Shwá, Bazarak, and Shatpal from the Panjshír Valley; Bajgah and Sar-Ulang from the Parwan Valley; and Kúshán, Gwálián, Gwázyár, Char-darya, Ghalalaj, Farinjal, and Shibr from the Ghorband Valley; altogether seventeen passes.

The Anjumán Pass leads, by the border of the Kafir country, from the head of the Panjshír Valley over into the lofty Badakshan district of Anjumán. Next to the westward is the Khawak Pass, also leading from the valley of the Panjshír to that of Indarab in Badakshan. Its crest is 13,200 feet above the sea, and it is one of the lowest and most accessible of the Hindu Kush passes. The Thal and Zarya passes cross the ridge at different points, but join the Khawak Pass on the northern

* Colonel Yule's 'Cathay, and the Way thither,' ii. p. 555 (n.).

† See his work, also 'J. A. S. B.,' 1841.

‡ Ibid., 1834.

§ 'Asiatic Researches,' vi. p. 457.

descent. It is probable that the Khawak Pass was used by Alexander the Great on his march from Bactria, and it was certainly the route by which the Chinese pilgrim Hiouen Tshang returned from India in A.D. 644. Timur also used the Thal Pass when he crossed the Hindu Kush in 1398. But the only travellers who in modern times have traversed the Khawak Pass are our gold medallist, Lieutenant Wood, R.I.N., and his companion, Dr. Lord, who approached it from the Badakshan side. At the foot of the pass is the secluded valley of Indarab, and Wood describes the mountains as rising like a wall, "without any intervening ridge to veil their majesty or detract from their bulk. The eye at a glance caught the mighty buttress, from its blackened base to its hoary summit: the snow-line on its mural face being clear and well defined." Dr. Lord places the line of perpetual snow, on this part of the Hindu Kush, at 15,000 feet. Wood gives us a delightful picture of the happy relations between the Tajik Chief of Indarab and his people. The foot of the pass is 29 miles from Indarab. The passage was made in the middle of April, when the road was one glistening sheet of frozen snow. The rise is remarkably uniform, not a ridge occurring in the whole ascent to vary the sameness of its surface. On the southern side of the crest the snow was 4 feet deep; and a descent of 25 miles brought the travellers to the inhabited part of the Valley of Panjshír.

Next to the Khawak, on the western side, is the Bazarak Pass, which is open from the middle of June to the end of October, and is used by ponies and donkeys, but not by camels. Four more inaccessible paths, called Shwá, Umraz, Yatumak, and Shatpal, lead over the crest and join the Bazarak on the northern side.

From the Parwan Valley there are two passes, called the Bajgah and Sar-Ulang.* The former was perhaps that crossed by Benedict Goes in 1603. The latter was attempted by Lieutenant Wood and Dr. Lord in the month of November, but they were met by a piercing wind and drifting sleet more like ice than snow. The snow soon became too deep for the horses, the road was obliterated, and they were obliged to give up the attempt. The Havildar employed by Colonel Montgomerie crossed the Sar-Ulang Pass on November 12th, 1873, and reported it to be about 12,000 feet above the sea. The road is fairly good, and the snow was of no great depth.

The Ghorband Valley is a defile running for a long distance parallel with the crest of the Hindu Kush.

The Kúshán Pass is the first of the series leading from it, and this route passes under the great peak which is visible from the city of Kabul on one side, and from Kunduz on the other. It is known as the

* So called from the last village, Ulang, on the Afghanistan side. *Sar-Ulang*, "head of the Ulang."

Hindu Kush, often called by Persian writers the Hindu Koh, and it gives its name to the range. Hence the Kúshán route passing under it is not unfrequently referred to as the Hindu Kush Pass.

It is a long defile, with a gradual and easy ascent, except for about a mile and a quarter, and the summit is 15,000 feet above the sea. It is closed by the snow from the 1st of November to the 15th of June. The Gwálián Pass is said to be easier than the Kúshán, but the Gwázyár is a mere footpath. Next to the westward is the Char-darya Pass, which is used by caravans, and is said to be practicable for artillery. Colonel Yule holds this to be the "Kipehak" Pass, by which the Emperor Baber first crossed the Hindu Kush in 1504, and after passing which he first beheld Canopus. "Till then," he says, "I had never seen the star Soheil (Canopus), but on reaching the top of the hill Soheil appeared below, bright to the south."* Westward of Char-darya come the passes of Ghalalaj, Farinjal, and Shibr. On the Farinjal Pass there is a very extensive but long-abandoned lead mine, which was examined in detail by Dr. Lord in 1837.† Here the mountains are quite barren, and streaked with snow. The Shibr Pass is at the western extremity of the Ghorband Valley, and descends upon the River Surkhab, which flows from Bamian. It is, therefore, the last of the Hindu Kush passes to the westward. Colonel Yule mentions that by the Shibr Pass the Chinese pilgrim Hiouen Tshang travelled on his way to India in 630 A.D., and it was crossed by Timur on his return from Delhi. It was also the pass most commonly used by Baber, who calls it Shibrtu, and says that it is the only pass never closed in winter.

Below the passes, the upper inhabited portion of the Hindu Kush watershed, through which the valleys by which the passes are approached wind their way towards the plain, is called the Kohistan. These three valleys are the Ghorband, the Parwau, and the Panjshír, and their rivers eventually unite and fall into the Kabul. The most western is the Ghorband, which rises on the eastern slope of the ridge connecting the Paghman Range with the Koh-i-Baba. Baber says that a steep hill pass is called *bend*; that this one is the route to *Ghor*, whence the name of Ghorband.

The Ghorband Valley has been described by Leech. Abul-Fazl, in the 'Ayín Akbari,' says that it contains an inconceivable variety of fragrant shrubs and flowers, including fifty species of tulips. At the mouth of the valley is the fort of Tutan-dara, where, on September 27th, 1840, General Sale encountered a party of Kohistanis in a strong position, and took it by assault, Captain Edward Conolly being among the slain. The Parwan is a similar valley, a narrow rocky defile with declivitous sides at the upper part, gradually becoming wider, but very tortuous, and at every turn a portion of the mountain projects over the stream. On these outlying shoulders there are patches of level ground, on which castles

* Page 133. † 'Geographical Papers,' by Wood, Leech, and Lord, pp. 53, 54.

are erected. Mulberry-trees are cultivated in terraces up the sides of the hills, and the flour made from the unripe fruit is the principal support of the Kohistanis. On the 2nd of November, 1840, Dost Muhammad defeated our native cavalry near the entrance of the Parwan Valley, but almost immediately afterwards he surrendered himself to Sir W. Macnaghten at Kabul. In this action Dr. Lord, the companion of Lieutenant Wood in his travels, was slain. The Panjshir is a similar valley, and all are inhabited by turbulent robbers, who are Tajiks by race, and probably descended from Persian settlers who came there in the earlier Muhammadan times, long before the Afghans acquired the ascendant.

On leaving the mountains, where they flow through narrow valleys, the three rivers enter the more open country between the Hindu Kush and the city of Kabul. This region, bounded on the north by the Kohistan, and on the west by the Paghman Range, is known as the Koh-i-Daman, or Skirt of the Hills, and is a country of great beauty and fertility.

The Koh-i-Daman has the Kohistan and the snowy peaks and passes of the Hindu Kush along its northern limit, where the three rivers of Ghorband, Parwan, and Panjshir issue from their narrow valleys. They eventually unite, after having irrigated the plain. In the eastern corner of the bounding hills is the famous "*Reig-Rawan*," or moving sand, adjoining the Panjshir River. Abul-Fazl, in the '*Ayín Akbari*,' says that in summer is heard, in this sandy desert, the sound of drums and kettle-drums; and the natives ascribe to the sand-hills the utterance of strange unearthly sounds. This led Lieutenant Wood to visit the spot, and he found the moving sand stretching up the side of the rock for 250 yards, with a base 100 yards wide, and an acclivity of 45°. He heard the sound like a distant drum, mellowed by softer music, which was caused by the fall of particles of sand into hollows, the rustle of the dry sand being condensed and reverberated by the circular conformation of the rocks around.

The Paghman Hills, to the west, separate the Koh-i-Daman from the valley of the Helmund. The sides of the Paghmans are split by numerous ravines, down which flow rills of purest water, and the slopes are thickly planted with mulberries and fruit-trees. At their bases much *débris* and heavy boulders are scattered over the plain, loosened by the winter's frost from the granite peaks above. The Paghman Hills are crossed by a very easy road over the Unah (*Honai*) Pass (11,320 feet), leading to Bamian. To the south the Koh-i-Daman is separated from the plain of the city of Kabul by a low ridge. To the east are the mountain spurs from the Hindu Kush, between which flow the Nijrao and Tagao rivers. Baber speaks of the Nijrao Valley as a sort of sequestered corner, where grapes and other fruits are abundant. The Tagao is said to flow through a fine open valley, containing many castles and fruit-gardens, and is

inhabited by Safis, or converted Kafirs. The Tagao receives the Nijrao and rivers of the Koh-i-Daman, and falls into the Kabul after a course of 90 miles.

Thus enclosed, the Koh-i-Daman has a length of 31 and a width of 7 miles. The western side is much higher than the eastern, and the drainage is consequently diverted to the south-east corner. The Ghorband River enters from the north-west corner, and the Panjshír from the north-east, the Parwan being in the centre, and uniting with the Ghorband about 4 miles below the hills. The Ghorband falls into the Panjshír at Ali-Burj, near the south-east angle of the Koh-i-Daman, and the united river breaks through an opening in the eastern hills, and finally joins the Kabul.

The northern portion of the Koh-i-Daman, watered by these rivers, is a basin lying 40 feet below the level of the south part. The former or lower portion of the valley yields grain, cotton, tobacco, and vegetables, and has innumerable plantations of mulberry-trees; while the latter is famed for its fruit-gardens. The Koh-i-Daman is thickly studded with castles and villages, but the inhabitants are turbulent, and life and property are very insecure. The people are, for the most part, of Tajik race, and many of the followers of Baber were also settled in the valley. The north-western part of the Koh-i-Daman is occupied by the Plain of Bagrám (8 miles long by 4), on which Mr. Masson made the immense collection of coins which were treated of by Professor Wilson in his '*Ariana Antiqua*.' In describing the view from the Plain of Bagrám, Masson says that the courses of the rivers, the picturesque appearance of the gardens and castles, the verdure of the pastures, the bold and varied aspect of the hills, crowned by the snowy summits of the Hindu Kush, form a landscape of surpassing beauty.

The Koh-i-Daman contains many towns, the chief of which is Charikar, near the entrance of the Ghorband Valley, and 40 miles from Kabul, which is the key to half the passes. It was the residence of a political agent during the English occupation, but the garrison was besieged in 1842, their water-supply was cut off, and nearly all were killed in the retreat. Eldred Pottinger, Lieutenant Haughton, and one Gorkha alone escaped. Another town is Istalif, about 25 miles north of Kabul, a lovely and enchanting spot. The houses rise in terraces up the side of a mountain, the summit of which is crowned by magnificent trees. The Emperor Baber* says that few countries possess a district that can rival Istalif. "A large river runs through it, and on either side are gardens, green, gay, and beautiful. Its water is so cold that there is no need of icing it. In this district is the garden called *Bagh-i-Kilan*, and on the outside are large and beautiful spreading plane-trees, under the shade of which there are agreeable spots finely sheltered."

* '*Memoirs*,' p. 107.

Istalif was partly destroyed as a measure of vengeance by General MacCaskill in 1842.

The Koh-i-Daman is obviously a position of great strategic importance, for it commands the outlets of all the Hindu Kush passes. Its command of the passes did not escape the vigilance of Alexander the Great, and there can be very little doubt that the city founded by the Macedonian conqueror, and called Alexandria ad Caucasum, was somewhere in the neighbourhood of Charikar (40 miles north of Kabul) or on the Bagrām Plain. The city, according to Strabo, was placed at the *Triodon*, or parting of three roads to Bactria. At Opiān, near Bagrām, three roads would converge from Bactria, leading over the Khawak, the Kúshán, and the Shibr passes; and here General Cunningham places this city of Alexandria. Bagrām (from *Vigrama*, a capital city) continued to flourish until it was destroyed by the ruthless hordes of Chingiz Khan.

The Koh-i-Daman was surveyed by Lieutenant Sturt, and also by Lieutenant Leech; but the maps and field-books of the gallant Sturt were lost, and Colonel Yule has pointed out the great deficiencies in our knowledge of this part of Afghanistan. We have no exact information respecting the Ghorband and Panjshír rivers from near the base of the Hindu Kush to their confluence, and none for the fertile valleys of Tagao and Nijrao, later than the 'Memoirs' of Baber. The whole district of the Paghman Hills and the Kohistan, which will be of extreme importance in the event of a war in that quarter, are blanker than the Desert of Gobi. The distances of Kabul from Charikar, Istalif, Ghorband, and Parwan, differ by many miles on the maps of Walker, Lumsden, and Cunningham. As regards Charikar there is a distance of $15\frac{1}{2}$ miles between the maps of Cunningham and Walker, and $7\frac{1}{2}$ miles between those of Cunningham and Lumsden. These discrepancies show the very unsatisfactory state in which our maps of this important region still remain.

Between the range of low hills forming the southern limit of the Koh-i-Daman and the first spur from the Safid-Koh is the valley of the Kabul River, in which stands the city of Kabul, with the Bala Hissar towering over it. The Kabul River rises close to the Unah Pass, over the Paghman Hills, at a height of 11,320 feet above the sea, and flows thence for 60 miles to the city of Kabul. In this part of its course it is everywhere fordable. The Logar River rises south-west of Kabul, on the spur which connects the Paghman Range with the Safid-Koh, and flowing northwards for 150 miles, falls into the Kabul River at a point about 10 miles north-east of the city, which is 6395 feet above the sea. Vigne describes the Logar Valley as a dreary waste bounded by still more barren mountains, the aspect of the scenery only being varied by patches of verdure produced by irrigation round the villages. But all

travellers agree that this dreariness is exchanged for a mass of smiling vegetation in the immediate environs of Kabul. "Shady orchards and meadows, made verdant by artificial streams, line the roads," and the country is highly cultivated for several miles round the city. After receiving the Logar, the Kabul becomes a rapid river with a great body of water; and about 30 miles lower down it is joined by the united streams of the Ghorband, Parwan, Panjshir, Nijrao, and Tagao rivers.

The River Kabul, thus increased in bulk by the drainage of the whole western division of the Hindu Kush, now enters the district of Lamghan; which is about 55 miles long by 15, bounded by the rivers Tagao, Kabul, and Kunar. The rivers Alishang and Kao unite in Lamghan as the Alingar, and, after a course of 10 miles, fall into the Kabul 30 miles above the mouth of the Kunar. The Emperor Baber calls the Kabul, the receiver of all these streams, the River Baran.* After flowing past Lamghan it breaks through a gorge called Tangi-i-Kharûn, in the mountains of the Siah-Koh, as the northern spurs of the Karkacha Hills are called, and is then joined by the Kunar River nearly opposite to Jalalabad. The Kabul then enters upon its lower course from Jalalabad to Peshawur.

The principal authorities for the geography of the upper basin of the Kabul River are the Emperor Baber in his 'Memoirs,' and Abul-Fazl in his 'Ayin Akbari.' General Cunningham has discussed the ancient geography, especially with reference to the campaigns of Alexander the Great, and Wilford, in the 'Asiatic Researches,' has recorded the Hindu traditions. Much information as regards comparative geography will also be found in Major Raverty's annotated translation of the 'Tabakat-i-Nasri,' in Professor Dowson's notes to Elliot's 'Muhammadan Historians of India,' in Colonel Yule's 'Cathay, and the Way thither,' and in the works of James Prinsep, edited by Mr. Thomas, as well as in the 'Ariana Antiqua' of Professor Wilson. The most exhaustive modern account is in the work of Mountstuart Elphinstone, with Macartney's memoir. Among the narratives of travellers are those of Foster, Alexander Burnes, Gerard, Leech, Lord, Griffith, Masson, and Vigne, and best of all, the second edition of Lieutenant Wood's Journey, with the exhaustive introductory essay by our gold medallist, Colonel Yule. I have already enumerated the sources of information respecting the Siah-posh Kafirs, and our existing knowledge is completed by the narratives of the native explorers so ably edited by our gold medallist, the late Colonel Montgomerie.

In conclusion, it will be well to enumerate the passes over the Hindu Kush which have been described in this paper, commencing from the eastern extremity of the range.

* It is also called the Kama, from Jalalabad to Peshawur, according to Jehanghir and to Macartney. The Kunar is called the Kama by some writers. Kama is a fort opposite to Jalalabad.

PASSES OVER THE HINDU KUSH.

I.

Chitral Division.

				Feet.
From the Valley.	Chitral	{	1. The Baroghil Pass	12,000
			2. The Ishtirak	
			3. The Agram	
			4. The Nuksan	17,000
			5. The Khartaza	
			6. The Dora	16,500

II.

Kafiristan Division.

The Passes unknown.

III.

Kohistan Division.

From the Valley.	Panjshir	{	7. The Anjumán Pass		Join on the northern descent.
			8. The Khawak	13,000	
			9. The Thal		
			10. The Zarya		
			11. The Yatamak		Connect on the northern descent.
			12. The Umraz		
			13. The Shwa		
			14. The Bazarak		
			15. The Shatpal		
	From the Valley.	{	16. The Bajgah		
			17. The Sar-Ulang	12,000	
	From the Valley.	{	18. The Kúshan	15,000	
			19. The Gwálián		
			20. The Gwázyár		
			21. The Char-darya		
			22. The Ghakalaj		
			23. The Farinjál		
			24. The Shibr		

The new Maharajahate of Sabak, Borneo.

By P. L. SCLATER, Esq., F.R.S.

THE foundation of a second state in Borneo under European rule, which has taken place during the past year, appears to have as yet attracted but little attention, though when the country has once become opened up, as is shortly likely to be the case, there can be no doubt that it will afford a fine new field for British enterprise.

The following extracts from the 'Straits Times' published at Singapore, contain some account of the commencement of the new "Maharajahate of Sabak," as it is called.

"The British steamer *America*, under charter arranged in London, which left this on 12th December, 1877, for a cruise amongst the islands of the Eastern Archipelago, has just returned from Labuan, and the East Coast of Borneo. She reached the former island on the 16th

December, and after a short stay there of a few days proceeded to Brunei, the capital of the kingdom of Borneo, where the chief of the Expedition, Baron de Overbeek, entered into negotiations with the Sultan for the cession of a large tract of territory in the northern part of the island, part of which had formerly been ceded to the American Trading Company of Borneo.

“After protracted negotiations, the efforts of the Baron, we understand, were crowned with complete success, and the powerful British Company (located in London, we believe) which he represents, are now the owners of the entire northern portion of Borneo from the Kimanis River northwards, and comprising amongst others the magnificent harbour of Gaya Bay, as well as Ambong and Maludu bays. From Brunei, after touching at various places of the newly acquired territory, the *America* sailed for the island of Sulu, H.M.S. *Hart*, Captain Evans, R.N., bearing the flag of his Excellency the Governor of Labuan, having previously sailed for the same destination. Both vessels anchored at the port of Meimbong on the southern side of the island in the Sultan's territory, the old capital of Sulu on the northern side, now called Banuwa, being at present in the possession of the Spaniards. At Meimbong, Baron Overbeek again opened negotiations with the Sultan of Sulu for the cession of his rights and possessions on the east coast of the island of Borneo, and here was equally as successful as at Brunei, the treaty being signed with the sanction and in the presence of her Britannic Majesty's Governor of Labuan and Consul-General for Borneo. These two cessions by the Sultans of Brunei and Sulu place the company which Baron de Overbeek represents in possession of the whole North of Borneo, from Kimanis on the North-West Coast to the Siboco River on the East Coast, a magnificent country, possessing the only good harbours in the whole of Borneo, being endowed with a most salubrious climate free from the visitation of typhoons, and forming in a mineral and agricultural point of view the richest portion of this great and fine island. It should be mentioned that before leaving Brunei, the Sultan conferred upon the Baron and his successors the title and rank of Maharajah of Sabak (which is the Malay name for the whole of North Borneo), and the Sultan of Sulu the title and rank of Datu Bandara (being the highest title next to the Sultan), and Rajah of Sandakan.

“From Sulu the *America* proceeded to Sandakan, where a grand meeting of all native chiefs and people was held, at which the proclamation of the Sultan of Sulu, announcing the cession of the territory, was read, and thereupon the Sulu flag was hauled down and that of the new British company hoisted in its stead. The Baron at the same time appointed as Resident of the company for Sandakan and the East Coast in general, Mr. W. B. Pryer, who had likewise been appointed by her Britannic Majesty's representative British Vice-Consul for the same district. Subsequently Baron Overbeek organised an expedition in his steam-launch *Enterprise*, up the great Kinabatangan River, by far the

finest water-highway into the interior of the northern part of the island. They proceeded about 230 miles up the river from its mouth, far beyond the highest point before reached by Europeans, and at the point where, from want of fuel, they were obliged to turn back, the river was still about 60 to 70 yards wide, and showed a depth of 7 fathoms. The country, so far as the Expedition went, is described as showing the finest soil on both banks of the river, fit for the successful cultivation of every description of tropical produce."*

I am the more anxious to call attention to this new district because it would appear to be well worthy of the attention of any naturalist who is desirous of exploring a tropical country, where he would be likely to meet with new discoveries, and would be at the same time, to a certain extent, under British protection. Borneo is certainly by no means yet fully worked out, as is evident by the wonderful white-tailed pheasant *Lobiophasis Bulweri*, lately discovered on the Lawas River, and the new *Polyplectron Schleiermacheri*, recently brought from the interior. Moreover, the Maharajahate of Sabak comprises the famous mountain Kini Balou on the north coast, where Mr. Low discovered the singular new pitcher-plants, *Nepenthes Edwardsiana* and *N. Lowei*, &c., and there can be no doubt that Kini Balou has many other novelties both in the vegetable and animal kingdoms to reward the patient explorer.

GEOGRAPHICAL NOTES.

Overland Telegraph through Africa.—The project of a line of telegraph through Africa, connecting the South African colonies with the Egyptian lines at Khartum, has recently been the subject of much discussion at the Cape, and is likely to attract further attention in this country. The following summary narrative will explain the part taken by the Royal Geographical Society in the matter.—The scheme was first mooted at the conference of Geographers on African exploration and civilisation, which met by the invitation of the King of the Belgians in September, 1876. It formed one of the suggestions submitted to the King, the idea being sketched out and shown to be feasible, in a pamphlet drawn up by Mr. Edwin Arnold, Colonel J. A. Grant, and Mr. Kerry Nicholls. Although nothing further was done in Belgium, the subject was not allowed to rest by its English proposers; and after a short time had elapsed, a conference was arranged between a number of members of the Council of the Royal Geographical Society and the well-known telegraph engineers, Sir S. Canning and Mr. Sabine, to ascertain whether the practicability of the scheme was sufficiently assured to encourage the proposers to collect, and make public, information on the subject. The result of the first conference was favourable to the project, and a minute in accordance with this was drawn up and

* Some further particulars as to the new territory are given in the 'Field' of September 28th last, in a letter signed "Mynah."

published in the 'Proceedings' of the Society, vol. xxi. p. 616. Copies of the minute were sent to the Secretary of State for the Colonies, to the Khedive, and to Sir Bartle Frere, Governor of Cape Colony, and the overland telegraph scheme was soon after publicly advocated by high authorities at the Cape, where, as also at Natal, a strong desire exists for telegraphic communication with Europe, and large subsidies have been voted for either a submarine or overland line. Colonel Grant meantime continued to gather by correspondence the opinions of African travellers, Egyptian telegraph employés, and others; until a considerable mass of information and testimony in favour of the practicability of the telegraph was got together, but quite independently of the Society. The Council, however, were at length applied to by the Colonial Office, by letter of October 28th last, for information as to the nature of the country and the practicability of a line of telegraph between Pretoria and Gondokoro; and they have recently, after giving the subject much consideration, sent, in reply, the documents named as follows:—First, a copy of a Report by Colonel Grant (to whom the Colonial Office letter was referred), in which he describes three routes which appear open for adoption, and expresses his opinion in favour of that which he calls the "east central line;" second, a copy of a further Report, which had been drawn up at a conference of members of the Society, aided by Sir Samuel Canning and Mr. Sabine; in which, together with much other information gathered by Sir Rawson W. Rawson, the estimates of cost of construction were given, but with regard to which the Council expressly stated that it was beyond their province to offer any opinion, the Report being submitted in the belief that it contained much of the information which the Secretary of State desired to obtain.—The mass of valuable information contained in these Reports, which has been collected and scrutinised with much pains, will no doubt eventually be published.

Prejevalsky's Second Journey to Lob Nor.—A correspondent writing to us from St. Petersburg, December 19th, says:—"Having obtained Prejevalsky's address, I went to see him, and found him restored to his habitual vigorous state of health, very busy preparing for his next expedition, in which he hopes he may reach Lhasa by the Hami and Sha-chau road, about which, however, his friends are less sanguine than himself, thinking he underrates the difficulties. At his rooms I met young Eklon, his companion on the last journey, an agreeable and unassuming young officer, with plenty of intelligence. He will accompany Prejevalsky again, and they will take an artist this time, so that his next book will be well illustrated. The collection of plants made in the last journey is being worked out, together with that of Potanin, by the eminent botanists Maximovitch and Regel, and the results will be published in a fine work on the 'Flora of Mongolia and Kan-su.' Fifty-six of the plates are ready and are admirably executed, as far as the drawings are concerned, but the lithography is not so good, considerable difficulty being met with in finding any artist here to undertake

this kind of work. Potanin's collection made on the borders of Mongolia, is rich; not so Prejevalsky's Lob Nor plants, the number of species being extremely few. Regel's son is at Kuldja, and it was he and not his father (as implied in the summary of Russian exploration in the last anniversary address of the Royal Geographical Society) who made an excursion last year in the Thian Shan."

The Alai and Pamir; Mushketov's Explorations.—The geological explorations of M. Mushketov during last year in the Alai and Pamir steppe extended over an interesting area.

After examining the deposits south of Margelan, which include jurassic, carboniferous, calcareous, and other strata, some of which yield naphtha, he crossed the Shah-i-Mardan Valley and ascended through the Kara-Kasyk gorge to the lofty region to the south. The path leading up to the highlands winds along the edges of perpendicular abysses many hundred feet in depth. Before the last-named pass, which leads over the mountains of South Khokand, is reached, the metamorphic limestone gives place to crystalline rocks, and the appearance of the mountains testifies to the nature of the geological change, rocky peaks and crags of fantastic shape being met with. Descending the Kok-su Valley, he advanced to the Alai, already explored by Fedchenko. M. Mushketov has arrived at the conclusion that this lofty, elongated valley, which varies between 8000 and 12,000 feet in height, belongs to the same class as the valleys of the Tian-Shan, which once acted as reservoirs for the mountain drainage, and were subsequently dried up. They run parallel with the nearest ranges, form first the upper valleys of streams, and then shrink to ravines lower down. Their former condition is illustrated by the still-existing lakes, Son-kul, Sairam-nor, Issyk-kul, and Kara-kul, which have not yet reached the "dried-up" stage. M. Mushketov crossed the Trans-Alai Range by the Tns-arassy (? Tirs-agar) Pass, and reached the banks of the Muk-su, but was unable to follow its course owing to a revolt in Shignan and Darwaz, occasioned by the death of Yakub Beg, of Kashghar. He visited, however, the Kara-kul Lake, which lies at an elevation of 13,200 feet, and is 40 versts in length by 21 in breadth. He considers that the lake was in all probability of larger extent formerly, and included the now dried-up basins of Kok-kum and Kara-kum. From Kara-kul M. Mushketov returned to the Alai, thence to Osh by way of the more eastern Jiptyk Pass, where he made some interesting observations of the chief geological features, and thence to the mountains east of the valley of Ferghana, thus connecting his new work with that executed during previous years. One of the general results of this journey is to throw light on the geological structure of the Pamir, and to prove that the northern part or Pamir-Khargoshi consists chiefly of granite, metamorphic clay, and mica slate, which are overlaid with strata of the trias formations; the direction of the granite upheavals is the same or nearly the same as the general trend of the Tian-Shan, i. e. north-east. Besides the geological information collected

regarding South Khokand and Ferghana, M. Mushketov has recorded some important opinions regarding the supposed meridional chain of Bolor, the existence of which he considers there is strong ground for doubting, and which he is inclined to think in reality consists of a mere mass of unconnected peaks belonging to different systems. He protests, in conclusion, against the practice so much in vogue among geographers of laying down arbitrary ranges without mastering or caring to inquire into the geological structure thereof.

Explorations north of Assam.—Captain R. G. Woodthorpe, R.E., and Lieutenant Harman have recently submitted an interesting report on their explorations to the north and north-east of Assam. In the Miri Hills across the frontier north of Lakhimpur, 1500 square miles of country were accurately defined on the scale of two miles to the inch, and about 400 square miles were reconnoitred on a smaller scale. The ranges of hills run more or less parallel to each other, east and west of the Subansiri, the outer range being generally low, rising to about 3000 or 4000 feet at some points, while immediately behind, the hills rise at once and very abruptly to 6000 to 8000 feet, and are densely clad with large forest trees and other growth. The rivers abound in fish, which attain a large size in the Kamla and Subansiri, and game is plentiful, especially deer. The last-named river is described as a noble stream in the hills, and the gorges through which it emerges into the plains are singularly fine, the banks formed of precipitous masses of rock enclosing pools 70 and 80 feet deep; the river itself is about 70 yards broad at Ganditula, and flows with great velocity. It is only navigable for a few miles beyond Sidang Mukh, but Lieutenant Harman calculates that at least 9000 cubic feet per second of its volume are derived from the country lying north of the twenty-eighth parallel of latitude. The Miris, the natives, are a hardy race of middle height and very wiry. From Captain Woodthorpe's description it would appear that their features are of a Tartar type. The same officer remarks that the influence and power of these frontier tribes have been designedly exaggerated by themselves with the object of securing larger allowances from the British Government. Those east of the Subansiri, called Abors, are supposed to be formidable, but without much apparent reason. The Miris, to the west of the same river, are great trappers of fish and animals, but are miserably poor. Captain Woodthorpe also explored a tract in the Mishmi Hills, in the course of which he obtained a fairly accurate knowledge of the sources of the Dihong River and the course of its main stream in the hills, an accurate knowledge of its course in the plains and of about 1000 square miles of the hills bordering it, and an approximate knowledge of an additional 1100 square miles in the hills. The Dikrang, Diphu and Digru rivers are also now well known. Government might well complete the work by deputing some surveyor to ascend the course of the Dihong as far as would enable him to solve the extremely interesting question of its connection with the Sanpu.

The result of these explorations is to prove that the volume of the Subansiri is only one-fourth that of the Dihong, which thus tends more than ever to identify the latter with the great river of Tibet.

Morrison's Visit to the New Course of the Yellow River of China.—After having made a journey from Hankow to Canton overland, an account of which will shortly be published by the Society, Mr. G. J. Morrison, the engineer of the Shanghai-Woosung railway, undertook an examination of the country between Chinkiang, on the Yangtsze-kiang, and Tientsin, in the north of China. The region traversed is tolerably well known to foreigners, but some of Mr. Morrison's notes with regard to the present condition of the Yellow River are of interest. The new course of the river below Lungmên-kau, where it commences, presents a scene of the utmost desolation; in some places it is more than 2 miles wide, and further down only about 250 yards. In the wider portions there are numerous banks, with channels between them, which are constantly altering. The Chinese authorities have built embankments for more than 100 miles on each side of the river, but, being apparently intended only to protect the surrounding country from inundation, they are built too far from the river to be of use in regulating the stream. The portion of the river from Lungmên-kau to the crossing of the Grand Canal, or indeed to Yüshan, 17 miles further on, according to Mr. Morrison, has entirely altered since it was visited by Mr. Ney Elias in 1868, and is still changing, but, on the whole, improving. This stretch of the river may be divided into four portions of about 30 miles each, the first of which is very bad, the second tolerably good, with 6 to 8 feet of water, the third rather bad, with occasional good reaches, and the fourth fairly good. For a few miles on each side of the crossing of the Grand Canal there are two courses through which the river flows, one of which has only 3 feet of water. The portion of the Grand Canal going north-west from the Yellow River is now quite dry, but the section of the river from Yüshan to Lo-kau (the port of Tsinan-fu) is in much the same state as it was ten years ago, and Mr. Morrison says that Mr. Ney Elias' plan* of this portion is still sufficiently accurate for all practical purposes.

Shanghai to Bhamô.—The China Inland Mission have lately made public an account of a remarkable journey performed, principally on foot, by Mr. McCarthy, who left Shanghai in December, 1876, and reached Bhamô on August 26th, 1877, having travelled a distance, including detours, of about 3000 miles. Mr. McCarthy took a somewhat different course from those followed by the late Mr. Margary, and the subsequent Yün-nan Mission, and he claims to have been "the first non-official traveller who has thus traversed the entire width of the empire and crossed the Kah-cheu hills to Bhamô." He followed the line of the Yangtsze-kiang as far as Wan-hsien in Sze-chuen, about half-way between Ichang and Chungking. Here he sent his boat on, and walked across country some 260 miles west to Shunking-fu. On the way

* 'Journal R. G. S.,' vol. xl. p. 27.

he visited the walled cities of Liangshan, Tachu, Kwangan, and Yochi, besides many other towns and villages. This part of Sze-chuen is densely populated; large villages and towns are numerous, and but little more than a mile apart. The people are very industrious, and hardly a spot of ground is left uncultivated; the hills, up to their very summits, are mostly covered with vegetation, wheat, beans, peas, rape, poppy, and rice being the chief crops. From Shunking, Mr. McCarthy went to Chungking, and thence to Kweiyang-fu, the capital of Kwei-chow. He found the country south of Chungking to a large extent uncultivated and sparsely populated. The prefecture of Anshun (also written Ganshun or Nganshun), however, is an exception; the city of that name is populous, and thousands of people attend the monthly fairs held outside it, some coming even from Kwang-tung and Kwang-si. Mr. McCarthy walked to Yünnan-fu, where he spent ten days, and then proceeded to Tali-fu. On the road he notes a linguistic peculiarity, viz. that the Nanking dialect is well understood, a circumstance which, he says, is due to the fact of many of the people being descendants of immigrants from Nanking and other parts of Kiang-su, who were sent there during the Ming dynasty. In this region the people (especially the women) were observed to suffer from goitre, often of immense size; and at a later stage of the journey places were passed through where great numbers were carried off by a disease resembling the plague (called by the Chinese *Yang-tsze*). From Tali to Têng-yüeh, or Momcin, is the most fertile part of the country. Yungchang-fu, Mr. McCarthy says, has been a fine city, and even now the southern part is well built over; it is called "Small Nanking" by some. After a brief stay at Momein and Manwyne, the traveller crossed the hills in two days and reached Bhamô without difficulty.

Indian Marine Surveys.—The chief obstacle to the active prosecution of marine surveys along the Indian coasts has been the want of a good surveying steamer. This want has now been supplied, for on the 4th December last the new paddle-wheel surveying steamer *Investigator* (the name of which will recall one of the greatest geographical feats of modern times—the making of the North-West Passage under Captain R. Maclure) was launched in Bombay dockyard. The new vessel is 584 tons burden, and is provided with a chart and drafting room, and with all the machinery and fittings for deep-sea sounding and dredging, as well as with those for coast surveying. She will thus prove a great gain to the cause of science as well as to that of commercial navigation.

Celebes.—Mr. H. S. Forbes left England last autumn to explore the zoology and topography of the interior of the island of Celebes. The Society has furnished him with an outfit of hypsometrical instruments, and hope to receive valuable reports from him.

The Keith Johnston Expedition.—In a letter from Aden, dated the 27th of December, Mr. Keith Johnston informs us that he is about to

embark in the *Punjaub* for Zanzibar. The detention at Aden had been utilised by Mr. Thomson in making a short exploratory trip across to Somali-land, the fruits of which are a short paper which he has sent to the Society, entitled "Four days in Berberah," containing, besides a general description of the place and people, some valuable observations on the geology and physical geography of the neighbourhood.

The Dar-es-Salaam Road.—Mr. Beardall, formerly of the Universities' Rovuma Mission, left England, on the 28th of November, to take charge of the works in connection with the road now making from Dar-es-Salaam to the interior of Eastern Africa. Sergeant Richards, R.E., followed in December to work under him. Eight out of the ten bullocks brought from Madagascar are doing good service on the road, and it is therefore clear there is no tsetse-fly on the forty miles already traced of the route; two out of the five donkeys have, however, been killed by lions, which as well as leopards are numerous. The country now reached abounds in ebony, sandal-wood trees of large size, indiarubber vines (*Landolphia*), and gum copal. An old native track or highway has served for the track of the new road, and it is said to reach a great distance inland, but in what ultimate direction is unknown at Zanzibar.

The French Ogowé Expedition.—The Expedition, which has just been brought to a conclusion after three years of hardship and danger, had for its object the examination of the Ogowé, the largest river in the French colony of the Gaboon. It was commanded by M. Savorgnan de Brazza, who was assisted by Dr. Ballay, and also in the earlier stages by M. Marche, the former companion of the late Marquis de Compiègne in his explorations in the same region. M. Marche, however, owing to the state of his health, was afterwards obliged to return to France, and he brought the last letters from the Expedition, of which nothing more was heard for fifteen months. MM. de Brazza and Ballay started from Lambaréné, the extreme limit of the European factories, in August, 1875, having as escort twelve *laptots* (native soldiers from Senegal in the French service) under a quartermaster. From the outset the explorers had to struggle against the ill-will and the cupidity of the blacks, and this struggle was destined to be renewed as they passed from one tribe to another, and eventually to end in open hostilities. The course of the Ogowé may be divided into three almost equal parts—the upper, middle, and lower. The middle portion follows the equator as nearly as possible, and the other two incline about a degree and a half southwards, the one towards the source, and the other towards the mouth. The party made their first halt at Lopé, a large village on the middle course of the river, whence M. de Brazza went by land into the country of the Fans, with whom he was able to establish friendly relations, and so to penetrate as far as Doumé, some distance along the upper part of the river. Here he was rejoined by Dr. Ballay in August, 1876. M. de Brazza became seriously ill through the fatigue of his long journey on

foot, and on his recovery he returned to the coast to collect all the merchandise he possessed, in order to afford them the means of subsistence. He was not able to rejoin his companions at Doumé until April, 1877, and they were about to make a fresh start, when the Adoumas raised the most serious difficulties, alleging that the white men had brought the small-pox among them, and stating that they could not leave their sick; they next demanded exorbitant payment for transporting the baggage, and finally declared that they would only allow part of the merchandise to be removed. The travellers eventually got away in two parties by a ruse, and met again at the Ponbara Falls, above which the Ogowé becomes an insignificant stream. Having settled in the negative the question of the communication between the Ogowé and the great lakes in the interior, the party in March, 1878, determined, notwithstanding their impaired health and diminished resources, to leave the basin of the Ogowé, with the view of penetrating further into the interior. Finding that with free natives as porters they only made about 6 miles in twenty days, and had several cases stolen, M. de Brazza, much against his will, bought forty slaves to carry the baggage. They thus traversed successively the countries of the Oudoumbo, Umbété, and the Batéké, where they found much difficulty in preventing their goods from being stolen. On leaving the basin of the Ogowé, the Expedition suffered much from hunger and thirst, for the region traversed was devastated by famine. The N'gambo, flowing to the east, led them to an important and previously undiscovered river, the Alima, which is 165 yards broad and 16 feet deep, and is thought to be one of the affluents of the Congo. M. de Brazza determined to follow the Alima first by land, and afterwards in canoes; but having come to blows with the natives, they deemed it prudent to leave the river, which continued to flow towards the east. They then turned their steps to the north, where the natives showed themselves less inhospitably disposed, but in which country they unfortunately could not procure a sufficient amount of provisions. After crossing several streams, all flowing to the east, the Expedition being reduced to great straits, was obliged to separate. M. de Brazza sent Dr. Ballay and the quartermaster back to the Ogowé, while he himself pushed his reconnaissance beyond the equator. As the rainy season drew near, M. de Brazza, to secure his own safety, was obliged to beat a retreat and rejoin his companions, with whom he descended the Ogowé, arriving at the Gaboon on November 30th, 1878.

Portuguese African Expedition.—On their arrival at Bihé from Benguela, the members of the Portuguese Expedition separated, Senhores Capello and Ivens proceeding northwards, and Senhor Serpa Pinto eastwards towards Zumbo on the Zambesi and the East Coast. The most southerly point reached on their way to Bihé was N'gola on the northern side of the Catanha Range, lat. $14^{\circ} 20'$ S. Regret has been expressed in Lisbon at the abandonment of the exploration of the Cuncue River, which was one of the objects of the Expedition, and considered of great

importance in view of the expected future development of the Portuguese possessions in this quarter.

Journeys across the Tumuc-humac Range of Guiana.—The Report of Her Majesty's Consul at Cayenne on the trade and agriculture of French Guiana in 1877, lately issued by the Foreign Office, furnishes some additional particulars respecting the first of the remarkable explorations made by Dr. Jules Crevaux, to which a brief allusion was made in the last Anniversary Address.* The Expedition originally consisted of Dr. Crevaux, two priests, and twenty men. After a month's travelling, however, the priests became dangerously ill, and returned to Cayenne; the men also abandoned their leader, but he persevered, ascended the River Maroni to the foot of the Tumuc-humac Range, crossed it, and finally, descending the Jary River, reached the Amazons after a march of 142 days. During the journey he travelled more than 500 leagues by land and water, 225 of which were over an entirely unexplored region. The two principal results of his expedition Dr. Crevaux stated to be:—1. His having succeeded in crossing the Tumuc-humac Range, which numerous explorers had failed even to approach during the last three centuries; and 2. His having discovered the true delineation of an important affluent of the Amazon, the River Jary, of which the navigation is of the most perilous nature, and on which he found grand falls. Dr. Crevaux notes a remarkable difference in the altitude of the valley through which the Maroni flows northwards from the Tumuc-humac Mountains, and of that through which the Jary winds to the south. He also calls attention to an expeditious route by which the Amazons may be reached in forty-five days from Cayenne, viz. by descending the River Yratapuru, which has scarcely any rapids, and falls into the Jary below its grand and most precipitous cataracts. According to Dr. Crevaux, it takes thirty-three days (of eight hours each) to reach the foot of the Tumuc-humac Range from the mouth of the Maroni; and for fifteen days, so sparse is the population of Indians along the river, that there is no opportunity of obtaining provisions, and in no case, even when met with, are the natives to be depended upon for revictualling. To obtain cassava and bananas, it is necessary to proceed without stopping as far as the first village of the Roucouyenne Indians.

Dr. Crevaux is now engaged in another expedition in the same direction. A letter from him, reporting his progress, dated October 3rd, 1878, was read at the Meeting of the Geographical Society of Paris, on the 17th of January. He had then reached the River Kou, an affluent of the Jary. After having crossed the summit of the Tumuc-humac, he found himself face to face with serious difficulties; the country cut up by numerous watercourses, the negro porters deserting, and other of his attendants ill with fever. He had met, however, with Indians willing to accompany him, and was resolved to continue his journey.

* 'Proceedings,' vol. xxii. p. 369. Two excellent maps by Dr. Crevaux have appeared in the 'Bulletin Soc. Géo.,' Nov. 1878.

Exploration of the Sierra Nevada of Santa Martha.—Mr. F. A. A. Simons has been for some months past engaged in exploring this snow-capped mountain-mass, which dominates the sea-board of New Granada a little east of the mouth of the Magdalena. Landing at Rio Hacha, he proceeded to Valle De Upar at the south-eastern foot of the Nevada, making this and St. Sebastian, an Indian village 6500 feet up the southern slopes, his base of operations. His object is Natural History investigation, but his Geographical observations so far have been of considerable interest, and our Society has sent him a set of hypsometrical instruments (three boiling-point apparatus and two aneroids) for the purpose of the more exact determination of the heights of the district.

United States Geological and Geographical Surveys.—In response to a Resolution of the House of Representatives, Professor F. V. Hayden has drawn up a report, showing the work done under his direction since the commencement of the Survey in 1867. No geographical work, it appears, was undertaken till 1871, in which year a reconnaissance was made from Ogden, Utah, through Idaho into Montana, extending as far north as Bozeman, and including a large portion of the drainage of the Upper Yellowstone and the Gallatin, Madison and Jeaffreson Forks of the Missouri. In 1872, a large party explored the head-waters of the Yellowstone, Gallatin, and Madison in more detail, while another explored the head-waters of Snake River (Lewis' Fork of the Columbia) in Idaho and Wyoming. In 1873, the Territory of Colorado was surveyed from lat. 38° to $40^{\circ} 30'$, and from long. $104^{\circ} 30'$ to 107° , altogether an area of about 23,000 square miles. In 1874, the work was extended westward and south-westward in Colorado, and about 13,000 square miles were surveyed. In 1875, this work was carried still further in Colorado and into the adjacent territories, an area of 24,000 square miles being completed. During 1876, the survey of Colorado was finished, and some work was done in Eastern Utah, the area covered being 10,000 square miles. In 1877, no less than 30,000 square miles were surveyed in Wyoming, Idaho, and Utah.—The publications issued under Professor Hayden's direction are voluminous and elaborate; they embrace, besides geographical matter, Reports on the geology, natural history, and agricultural resources of the country examined. Some thirty-one maps have also been published, in addition to a magnificent geological and geographical atlas of Colorado and portions of adjacent territories.—Dr. Hayden's *résumé* is accompanied by a map exhibiting the progress of the surveys under his charge, on which are shown the areas surveyed by trigonometrical method, or by reconnaissance, and of geological work alone.

New Geographical Society.—A new Society has just been constituted in Berlin under the title of *Central-Verein für Handelsgeographie und Förderung Deutscher Interessen im Auslande*. The President is Dr. R. Jannasch, the Secretary Dr. O. Kersten, and the Treasurer Mr. Emil Brass, F.R.G.S.

Obituary.

Dr. Augustus Petermann.—In continuation of the record of members deceased during the interval since the last anniversary of the Society, it is our duty to give prominence to the eminent geographer, Dr. Petermann, whose life was suddenly cut short under melancholy circumstances on the 26th of September last.

Dr. Petermann was born on the 18th April, 1822, at Bleicherode, a town lying at the northern foot of the Harz. The young man was at first intended for the Church, but after attending the Grammar School of that town, where he already showed a marked inclination for geographical study, and some talent for map-drawing, he was moved by his friends to the Geographical Art-School founded by Berghaus at Potsdam. While at this institution, he was employed in carrying out important cartographical works, and always spoke with a proud recollection of his first connection with Alexander von Humboldt, for whose work on Central Asia he designed the well-known map which depicts the mountain system of Asia.

In 1845 Petermann received a summons to Edinburgh. He was here employed by the late Dr. A. Keith Johnston on an English edition of Berghaus' Physical Atlas. He removed to London in 1847, and pursued for some time his profession as geographer, taking besides an active part in the preparations of the great African Expeditions of Richardson, Barth, Overweg, and Vogel, and, afterwards, in the discussion on the lost Expedition of Sir John Franklin. His active interest in these two great fields of exploration, Central Africa and the Arctic Regions, never flagged. He published numerous articles, letters, and treatises on both subjects; corresponding with many of the chief travellers, and working out with zeal and promptitude their cartographical results. With regard to the Arctic question, he propounded and maintained for many years a theory of a comparatively warm polar sea, the high temperature of which was kept up by the Gulf Stream pouring through the sea between Spitzbergen and Nova Zembla. This and other similar speculations were characteristic of the enthusiastic and imaginative character of the man, and he abandoned them only when actual exploration rendered them no longer tenable.

In the year 1854 the Messrs. Perthes invited Petermann to Gotha as conductor of the Geographical Institute into which their well-established business as cartographers was about this time being developed. Shortly afterward Petermann commenced the well-known '*Geographische Mittheilungen*,' of which the twenty-fourth volume is now completed.

Whilst engaged with unwearied industry and great literary tact and skill in providing (partly with his own pen) solid yet readable articles, and directing the compilation of maps for each monthly part of this periodical, he found time to take an active and often an initiatory part in the promotion of expeditions. Thus he was the prime mover in the expeditions of Von Heuglin, Munzinger, the unfortunate Moritz von Beurmann, of Gerhard Rohlfs, and of the German Arctic Expeditions.

As cartographer Petermann stands undoubtedly in the first rank. Stieler's great atlas owes its popularity mainly to the exemplary work of Petermann, though, perhaps, the six sheet map of the United States of America, which he published in 1875, is equally worthy of mention, being acknowledged by the most reliable authorities of the Union as the best in existence.

It cannot be said that these merits remained without recognition. Honours flowed in from all sides. He was honorary or corresponding member of many scientific Societies, of the geographical Societies almost without exception. As may naturally be supposed, orders and decorations of various classes were not wanting;

medals and diplomas followed on every International Exhibition. But the honour which he most valued was the gold medal of the Royal Geographical Society of London, conferred in 1860, on the motion of Sir Roderick Murchison. He was elected Honorary Corresponding Member in 1863.

Don Manoel Pardo, formerly President of Peru, who met his death at the hands of an assassin on the 16th of November last, was an Honorary Corresponding Member of the Society. He had for some time prior to his death filled the office of President of the Senate at Lima, and his assassination is supposed to be due to the jealousy and hatred with which he was regarded by his political rivals, he being the fearless champion of the cause of education, progress, and constitutional government in the Republic. His claims to recognition on the part of our Society were founded on the services he had rendered in promoting scientific expeditions to explore the less-known parts of the Peruvian territory, and especially the numerous rivers east of the Andes, and their navigable connection via the Amazons with the Atlantic. His funeral was celebrated with great pomp and amid almost universal expressions of grief on the 21st of November.

CORRESPONDENCE.

On the Transfer of the Population of St. Andro on the Mosquito Coast to Andros, one of the Bahamas, in 1787.

UNDER the heading of the "Two Providence Islands," by W. Noel Sainsbury, in the 'Proceedings of the Royal Geographical Society,' vol. xxi. p. 148, reference is made to the fact that the grants of the 4th December, 1630, and the 1st November, 1670, of Providence Island on the Mosquito Coast and Providence in the Bahama Islands respectively, "*include* another island of the same name, viz. Andrea or Andros." As to the origin of the name of the Bahama Andros, I have already expressed my opinion to the Secretary of State, in a despatch dated the 14th August, 1877, which has doubtless been forwarded to the Geographical Society, or which can be obtained by that Society on application to the Colonial Office. Andros is not *named* in the grant of 1670, though *included* therein.

If it is curious that these grants "*include*" an island of the same name, it is also, I think, more interesting and quite as curious to know that the inhabitants of St. Andro on the Mosquito Coast were bodily transferred to Andros, the largest of the Bahama Islands, in the year 1787.

The following is an account of this transaction. On the 23rd February, 1787, the Lieut.-Governor of Jamaica wrote to the Governor of Bahamas:—"I have lately received an application from the inhabitants of the Island of St. Andro on the coast of the Mosquito shore, which by the late convention with Spain is now to be *evacuated*, requesting that I will remove them to your government. They have been chiefly employed in the cultivation of cotton, of which they had favourable accounts from the Bahamas, and if you have room for them, may become valuable settlers; but I do not wish to encourage them to go there with their slaves and effects, until I hear from you that they can be easily accommodated with lands suited to their purposes, and upon what terms. They consist of about three or four hundred persons of *all descriptions and complexions*, and they will be supplied from home with provisions for a few months after their arrival."

The Governor of the Bahamas in Council, on the 15th March, 1787, came to the conclusion "that several of the islands within this Government will afford a comfortable asylum for the late inhabitants of Andro. That as it is impossible at present

to point out a particular situation for them, it would be advisable that *three or four* of the most intelligent and respectable of those people, a competent time before the general embarkation, visit and inspect these islands in order that they may be enabled to fix on a proper spot." This was communicated to the Lieut.-Governor of Jamaica, and acted upon, and arrangements were made for the transfer of these people. On the 11th September, 1787, the Governor and Council of the Bahamas received a petition from "divers persons on behalf of themselves and others, late inhabitants of the Island of St. Andro, setting forth that the petitioners having received a favourable account of the Island of Andros, one of the Bahamas, are inclined to settle thereon, and praying that some assistance might be afforded for their conveyance thither."

Upon this the Governor of the Bahamas in Council decided "that proper vessels and pilots be forthwith provided for that purpose, as well for the accommodation of the petitioners as for the use of the Government by discharging the transport ship *Commoro*, employed for conveying the said petitioners from St. Andro to these islands, the said ship lying at a very great expense and of too great a draught of water, to convey the said petitioners immediately to the said Island of Andros." On the 23rd October, 1787, the Governor and Council resolved "that in consequence of the resolution of this Board of the 11th September last, respecting the transporting the late inhabitants of St. Andro, Mosquito shore, to the Island of Andros, the accounts amounting to £— were laid before the Board, and the Crown Agents were drawn upon for the amount."

The descendants of these people now form a portion of the population of Andros, the total number of which is about 1400. Before the arrival of the inhabitants from St. Andro, Andros had a large population, probably larger than it has now, for in the Instructions to the Governor, dated 1st December, 1784, H.M. the King directed that "two members should sit in the Assembly for Andros Island."

Between that date and 1787 large grants of land were made in that island to between sixty and seventy persons of undoubtedly English origin, viz. Hall, Young, Brown, Johnson, James, North, Rigby, McDonald, Wilson, and others. What has become of these latter people it is impossible to say, as there are but few, if any, white people residing now in Andros. It is probable that on the abolition of slavery they or their descendants left Andros and settled in New Providence, as the names are common in Nassau.

WILLIAM ROBINSON,

*To the Secretary of the
Royal Geographical Society.*

Governor of the Bahamas.

REPORT OF THE EVENING MEETINGS, SESSION 1878-9.

*Fourth Meeting, 13th January, 1879:—*Major-General Sir HENRY C.

RAWLINSON, K.C.B., Vice-President, in the Chair.

PRESENTATIONS.—*Rev. Arthur Watts; Leopold McKenna, Esq.*

ELECTIONS.—*J. Caudwell, Esq.; W. G. A. Grant, Esq.; Maj.-General W. C. R. Macdonald; Alexander MacGregor, Esq.; Robert John Moffat, Esq.; Wm. J. Pridham, Esq.; Edwd. Hamilton Pringle, Esq.*

Mr. EDWARD HUTCHINSON read an account which he had prepared, of recent events on Victoria Nyanza, chiefly in connection with the Church Missionary Society's operations in that region. The reinforcement for the Mission sent from England to Uganda, via the Nile, after the death of Lieutenant Shergold Smith and Mr. O'Neill, reached

Khartum the first week in August last, the party of four being then, however, reduced by one who had succumbed to the terrible heat at Suakim. They were kindly received by Colonel Gordon at Khartum, who insisted on furnishing them with ample stores for their journey. They left Khartum on the 13th of August, bound for Lado, thence to Dufli (using the elephants which Colonel Gordon had placed upon that line): from Dufli they would take the steamer to Magungo on the Albert Lake, and march thence to Masindi M'rooli, and so to Rubaga, the capital of Uganda. At Khartum the party were fortunate in meeting an embassy sent by King Mtesa, at the instance of Mr. Wilson, to Colonel Gordon with peaceful overtures, and they were returning together. The consolidation of peaceful relations between Mtesa and Egypt was an object which the Church Missionary Society used their best endeavours to promote. Last year they memorialised Her Majesty's Government on this subject, and their application was most favourably received, with the assurance that a representation on the subject of the independence of King Mtesa should be made to the Egyptian Government. Mtesa was much pleased when a copy of the memorial to the English Government was translated to him by the Rev. Mr. Wilson. The king had now determined to send an embassy to friendly England, with presents for the Queen; and Lord Salisbury, on being informed of this intention, had replied that Mtesa's messengers on their arrival should be received with the courtesy and attention due to the representatives of a king who had shown himself desirous of entering into friendly relations with this country, and had always received with kindness, and afforded his powerful protection to, British subjects who had visited his kingdom. Lord Salisbury premised that he should not feel himself justified in recommending to the Treasury any expenditure on account of the proposed mission. Mr. Hutchinson expressed a hope that the Council of the Royal Geographical Society would use their influence to secure a kind and hospitable reception for the representatives of a king who had done so much to aid English travellers.

During his residence at King Mtesa's capital, Mr. Wilson had kept up a series of thermometrical and barometrical observations. The temperature rarely, if ever, reaches 90° in the shade, and does not fall below 60° at night. The climate is mild and fairly healthy to Europeans, and there is always a pleasant breeze in the middle of the day. Soon after his arrival at Kagéi (middle of February) he noticed that the Nyanza was slowly rising. About the middle of May, i.e. about ten days after the rains had ceased, the level was at its maximum, and it then began to recede; the total rise, above a point on a rock which he had marked at first, being exactly 2 feet. On his arrival at Kagéi on 12th of January, 1878, he found, to his surprise, on his marked rock the water within 1 inch or 1½ inch of its maximum in the previous May, owing to the excessively wet season. He concluded that this considerable rise over the great area of the lake must have immensely increased the volume which poured over the Ripon Falls, and that the lake thus plays an important part in the annual inundation of Egypt. On his again visiting Kagéi, March 15th, he found the water at exactly the same level as on January 12th. A few days later at Uganda he obtained evidence of its abnormally high level on the northern coast. Mr. Hutchinson observed that as no appreciable rise (according to authorities) is found in the Nile above Khartum, the whole of this enormous volume of water is dispersed somewhere among the marshes of Unyoro or some backwater about the Albert Nyanza, as the floods of the Shary are in the backwaters of Lake Chad.

Other items of information received from this region were the death of the gentle old King Rumanika of Karagwé, and the despatch of an army by Mtesa to secure the throne for one of the deceased king's sons. June and August last Mr. Wilson spent on a voyage along the western part of the Victoria from Uganda to Kagéi, during which he maintained friendly intercourse with the natives. He found at

Kagéi his colleague, Mr. Mackay, who had pushed on from Unyanyembe, and who had with great tact and courage re-established peace with King Lukongeh of Ukerewe, entrusting himself unarmed to his power, and ascertaining definitely that the slaughter of Messrs. Shergold Smith and O'Neill was not premeditated, but that they fell in attempting to defend their Arab friend Sungoro, with whom alone was Lukongeh's quarrel. Mr. Mackay had repaired the Mission steamboat *Daisy*, and was getting ready the stores of machinery, tools, and useful articles that had been lying at Kagéi for shipment across the lake to Uganda. It was part of the plan of the Church Society's Mission there to teach the natives the useful arts, and therefore forges, turning lathes, and the materials for saw-mills had been sent out. It was not intended to establish factories with the idea of producing articles of export, because the time for that had not come, but it was necessary to make the Mission self-supporting, and at the same time to show Mtesa and his people the advantages of civilisation.

Colonel GRANT said Mtesa was first visited in 1862-3, by Speke and himself. Since then a great change had taken place in Uganda. In 1862 Mtesa's dress was the ordinary robe made in the country, of bark cloth. The Arabs had then scarcely found their way to Uganda. He was so delighted with the novelty of the European articles with which Speke presented him, that after Speke and himself had been his guests for several months, he gave them permission to depart, though it was a difficult matter to induce him to allow them to leave him. He was at first very much opposed to their returning through Egypt, though they did not then know what his objection really was, and he would have preferred their returning by the direct route through the Masai country to the East Coast. All the time they were with him they received the greatest hospitality, and when Sir Samuel Baker was hard pressed by the people of Unyoro, and had to fly for his life, King Mtesa sent an army under his own commander-in-chief to rescue the Englishman who was being surrounded by the Wanyoro, and they reached Baker, luckily, just in time to turn the scale. Sir Samuel Baker, in recognition of the services thus rendered, told the soldiers to inform their master that as long as Egypt could draw a sword, she would never be the enemy of Uganda. On another occasion Mtesa rendered great service by assisting in the search for Livingstone. Sir Samuel Baker told him that a white man from England was lost somewhere far away in the south country, and asked him to help in finding him. Mtesa sent two expeditions for that purpose, and the letters which they conveyed from Sir Samuel Baker were delivered into Cameron's hands at Unyanyembe. By the services which he had rendered to Speke and himself, to Baker, Stanley, Colonel Long, and Linant de Bellefonds, Mtesa had given them the key to the Nile and the whole geography of that district of Africa. He therefore hoped that if his envoys were spared to come to England, the Geographical Society would give them a hearty welcome.

The CHAIRMAN said there was one point which he had learned from Colonel Grant to which he desired to draw further attention. It appeared that Mtesa had at heart the opening-up of a direct communication between the Victoria Nyanza and the sea-coast through the Masai country. That route was interesting to the Society, as being the one which first attracted the attention of the African Exploration Fund, and which they were prepared to take up in the first instance, but were deterred mainly by reports of the extreme difficulty of getting through the country. In fact, they were told that it was perfectly impossible to pass through the tribes to the west and south-west of Kilimanjaro, and that of an Arab caravan of some thousand or more only a very few had returned to the coast alive. On that account they gave up the project, and determined to adopt a more southern and safer field of exploration. But if it were true that Mtesa was really interested in that line, he was sure that geographers in this country would gladly co-operate with him in carrying the inten-

tion to maturity. The country between Kilimanjaro and the lakes was absolutely unknown at the present time, and only one or two routes were known between Kilimanjaro and the coast. He did not know if Mr. Hutchinson had received any information on that point. If he had, the Society would be glad to hear it.

Mr. HUTCHINSON said that Mr. Wakefield, of the Ribe Mission, near Mombasa, who knew well the Galla and Masai country, would be home in March. What Colonel Grant had stated agreed with the information that had been received by the Church Missionary Society. There could be no doubt that an effort would be made to find an outlet to the East Coast more direct than the present one. The distance from Uganda to the coast in a straight line was not great. He had given some attention to this question, and his impression was that the route by the Dana or Ozi River and Mount Kenia would avoid the Masai, and afford direct communication with the Nyanza. It was a very important point with the interior tribes to have access to the coast. The harbour of Mombasa was an admirable one, there being none like it till Dar-es-Salaam to the south was reached. This latter, however, was too far to the south for an available road, considering the network of marsh and river between Bagamoyo and Kilimanjaro. He did not know whether Mtesa still entertained the idea of damming up the Nile, and flooding the country south of Victoria Nyanza, so as to bring him nearer the coast. It was not impossible in these engineering days, and appeared quite as feasible as cutting a channel from Cape Juba and flooding the Sahara.

Colonel GRANT said he had forgotten to read a letter that he had received from Mr. Wilson dated two days later than that to Mr. Hutchinson.* Mr. Wilson said: "I am forwarding to you a Uganda shield and two spears, which Mtesa has asked me to send to you with his salaam. You will be pleased to hear that the prospects for the mission there are very hopeful. Mtesa is very anxious for Englishmen to come, and says he wishes to have no more dealings with the Arabs. These latter have of course opposed us very strongly, and have tried to poison Mtesa's mind against us by all sorts of stories. Mtesa is terribly afraid of the Egyptians, and looks with the utmost suspicion on anything and everything connected with them, which will I fear greatly retard the opening-up of the Nile for traffic. On the other hand, Mtesa is desirous of opening a road to the East Coast through the Masai. You will be very sorry to hear that your old friend Rumanika is dead." When he (Colonel Grant) was there Rumanika had five sons, the favourite one being the youngest, named Kukoko, and probably he would be the successor; but when a king died the successor was generally asked to swear allegiance to the position of a king, and one son might say, "I am not fit for it," and the one who would promise to do his best would be the king even if he was the youngest. The letter continued—"I hope very shortly to return to Uganda to continue the work we have begun. I have already made some progress in the language of Uganda, which in its idioms and construction resembles Suahili."

The following papers were then read:—A Journey through Cyprus in the Autumn of 1878. By J. Thomson. Notes on the Pre-historic Period of Cyprus. By Major-General Sir H. C. Rawlinson, K.C.B. (*Ante*, pp. 97, 106.)

DONATIONS TO THE LIBRARY AND MAP-ROOM.

DONATIONS TO THE LIBRARY FROM 25TH JUNE TO 11TH NOVEMBER, 1878.—Colonies nationales dans l'Afrique Centrale, par Émile Reuter (*Author*). Recent Journey of Exploration across Australia, by Jess Young (*H. W. Bates, Esq.*). Bijdrage tot de Kennis der Weersgesteldheid ter Knste van Atjeh, door P. A. Bergsma en L. Backer Overbeek (*Dr. Bergsma*). Letter on Dredging Operations of U.S. Coast Survey steamer *Blake*, by A. Agassiz (*Author*). Exploration et Colonisation, par X. Brau de St. Pol-Lias (*Author*). Parliamentary Reports on Mr. Robertson's Tour in Coimbatore, 1878; the Crozet Islands, 1877; and the Gambia River, 1877 (*Lord Arthur Russell*). Geology of Wisconsin, Survey of 1873-77, vol. ii. (*T. C. Chamberlin, Chief Geologist*). Materialien zu einer Klimatologie des Kaukasus, von A. Moritz, Abth. i., Bd. 2, pts. 1 and 2 (*Dr. Moritz, Director of the Tiflis Observatory*). Ethnographische Karte der Europäischen Türkei und ihrer Dependenzien, 1877, von C. Sax (*Author*). Barclay Observatory Observations to end of 1877, vol. iv., 1878 (*J. G. Barclay, Esq.*). Monographie der Gattung Cinchona, and Zur ältesten Geschichte der Pflanzen, von C. E. O. Kuntze (*Author*). Die geognostische Durchforschung Bayerns, von C. W. Gümbel (*The R. Bavarian Academy of Sciences*). Découvreurs et Missionnaires dans l'Afrique Centrale au XVI^e et au XVII^e siècle, par J. Brucker (*Author*). New Zealand and the South Sea Islands, by Sir Julius Vogel; Cyprus, by P. Robinson; Davos-Platz, a new Alpine resort; and Particulars of the Island of Naitamba, Fiji (*The Librarian, R.G.S.*). Cultivation and Manufacture of Tea, by E. Money (*Messrs. W. B. Whittingham and Co.*). Notes and Recollections on Tea Cultivation in Kumaon and Garwhál, by J. H. Batten (*Author*). Les Colonies Portugaises, par E. Lobo de Bulhões (*Author*). Collecção de monumentos ineditos para a historia das conquistas dos Portuguezes, 1^a serie, vi. Boccaro, pts. 1 and 2; Historia do Congo, por el Visconde de Paiva Manso; Historia dos estabelecimentos scientificos, &c., de Portugal, por J. S. Ribeiro, vols. iv.-vii. (*Royal Academy of Sciences, Lisbon*). Apuntes sobre las Tierras Patagónicas, por F. P. Moreno (*Author*). Imperial Maritime Customs, China; Medical Reports, 14th issue (*Mr. R. Hart*). Catalogue de la collection, Douanes maritimes, Paris Exhibition (*Colin Jamieson, Esq., Commr.*). Account of Publications of the Société Impériale des Amis des sciences naturelles, &c., de Moscou, par D. Anoutchine (*Author*). G. V. Juggarow's Observatory, Vizagapatam; Results of Meteorological Observations, 1877, by A. Nursingrow (*Mr. Nursingrow*). Report of the New York Meteorological Observatory for 1877 (*D. Draper, Esq., Director*). Das goldene Vliesz, von P. W. Forchhammer (*Author*). Memoria sobre la situacion de Santa Cruz de Mar Pequena, de P. A. Galiano (*Author*). Application of Photography to Reproduction of Maps, by J. Waterhouse (*Author*). Reports on Location of Canadian Pacific Railway, by Sandford Fleming (*Author*). Report on Progress, &c., of Kew Gardens, 1877, by Sir J. D. Hooker (*Prof. Thistleton Dyer*). Geographical Notes on Kiangsi, by H. Kopsch (*Author*). Account of Tour to North of Norway, by R. P. Spice (*Author*). Journal of Expedition between Assonan and Abouhamid, by E. Fechet (*General Stone*). North-West Africa, by Donald Mackenzie (*Author*). Modern Languages of the East Indies, by R. N. Cnst (*Author*). Bædeker's Lower Egypt (*Editor*). British Guiana at the Paris Exhibition, by W. Walker (*Author*). The Capital of the Tycoon, and Art in Japan, by Sir Rutherford Alcock (*Author*). La Patria Chilena, by E. Seve; The Andes and the Amazon, by J. Orton; L'Empire du Brésil à l'Exposition de 1876; and New Granada, by J. F. Holton (*C. H. Wallroth, Esq.*). Ups and Downs, a Story of Australian Life (*S. W. Silver, Esq.*). Cyprus, by E. G. Ravenstein

(*Author*). *Encyclopædia Britannica*, 9th edition, vol. viii. (*Messrs. A. and C. Black*). Rapport de la Commission d'Exploration, Canal interocéanique, par L. N. B. Wyse (*The Committee of Direction*). Syrian Great Eastern Railway to India, by G. E. Dalrymple (*Mrs. Thos. Leslie*). Unequal Distribution of Heat, by A. J. Cooper (*Author*). L'Hydrographie Africaine au XVI^e siècle, par L. Cordeiro (*Author*). Ethnography and Ethnology, by Élie Reclus (*Author*). Murray's Handbooks for Northamptonshire and Rutland, and England and Wales alphabetically arranged (*John Murray, Esq.*). Catalogue of Museum of Practical Geology (*The Director-General*). Von Algier nach Oran und Tlemcen, von O. Schneider und H. Hass (*Editor*). I momenti della Geografia nell'Evo medio e moderno, Regione Britannica, Saggio di Geografia elementare, La nostra patria, Mondo antico, pts. 1-3, and Nuovo mondo, by E. Balbi; and Principii generali della Geografia, by E. & A. Balbi (*Prof. E. Balbi*). *Aeneidea*, by the late H. James (*The Trustees of the Author*). Manuel du Voyageur, par D. Kaltbrunner (*Author, per MM. Wurster*). Den Danske Gradmaaling, vol. iii., by C. G. Andræ (*Author, per the Danish Minister*). Ethnologische Excursionen in der Malayischen Halbinsel; and an Ethnological Excursion in Johore, by N. von Miklucho-Maclay (*Author*). Catalogue of Books of the Bristol Museum and Library (*The Council*). The Influence exercised by Trees on the Climate, &c., of India, by E. Balfour; Robinson's Report on the Laccadives; Markham's Memoir on Indian Surveys, 2nd edition; Catalogue of MSS., Maps, &c., of Indian Surveys (2 copies); Archaeological Survey of India, vol. vi.; Burgess's Archaeological Survey of Western India, vol. iii.; and Meteorological Observations at Madras in 1851-55 (*H.M. Secretary of State for India*). Special Settlement of West Australia north of 19° S. Lat. (*H.M. Secretary of State for Colonies*). Palestine Exploration Fund, Quarterly Statements for July and October, 1878 (*The Survey*). Zeitschrift des Deutschen Palästina-Vereins, unter der Redaction von Hermann Guthe, Bd. i. pt. 1 (*The German Palestine Society*). Central African Mission, Occasional Papers, No. viii. (*Rev. R. M. Heanley*). Reports of Committee of Council on Education, England and Wales, and Scotland, 1877-78; and Fifth Annual Report of Board of Education for Scotland (*The Committee of Council on Education*). Geological Survey of Canada, Report of progress for 1876-77 (*A. R. C. Selwyn, Esq., Director*). Rates of Chronometers on Trial at Royal Observatory, Greenwich, 1878 (*The Astronomer Royal*). Victoria: Statistics of Friendly Societies, and Title and Contents of Statistical Register for 1876; Mineral Statistics for 1877; Statistical Register for 1877, pts. i.-iii.; and Report of Chief Inspector of Mines, 1877 (*The Victorian Government*). Pugh's Queensland Almanac for 1878 (*The Agent-General for Queensland*). Report upon U.S. Geographical Surveys W. of 100th mer., vols. ii. and iv. (*Lieut. G. M. Wheeler*). Letters referring to Mr. Stanley; Commerce du Portugal, 1866-75; Population de Lisbonne, 1864-78; Instruction primaire de Lisbonne, 1878; De l'enseignement de la Géographie; Expédition Portugaise à l'Afrique Centrale; Exploration de la Guinée Portugaise; and Boletim da Sociedade de Geographia de Lisboa, No. 3 (*The Geographical Society of Lisbon*). Bulletin de la Société de Géographie de la Province d'Oran, No. 1 (*The Society*). Nouvelle Géographie universelle, par Élisée Reclus, livraisons 188-207. And the current issue of publications of corresponding Societies, periodicals, &c.

DONATIONS TO THE MAP-ROOM, FROM 24TH JUNE TO 11TH NOVEMBER, 1878. —Government Surveys of India, 129 sheets (*India Office*). Admiralty Charts, 48 sheets (*Hydrographic Office*). Eastern portion of South Africa, sheets 5 and 6; Portions of Servia and Bulgaria, sheet 1; L'île Chypre; Kiepert's map of Turkey in Europe, Treaty Boundaries; Turkey in Europe, sheet 4; White Nile from Khar-toum to Victoria Nyanza (*Quartermaster-General*). Ordnance Survey, 202 sheets

(*Director-General of the Ordnance Survey*). Marine Survey of India, 2 charts (*Marine Survey Department, through Commander A. Dundas Taylor, I.N.*). United States Charts, 3 sheets; Atlas of Meteorological Charts of the Pacific Ocean (*Capt. S. R. Franklin, U.S.N., U.S. Hydrographer*). Geological and Geographical Atlas of Colorado (*Professor F. V. Hayden*). Geological and Topographical Atlas of the Geological Exploration of the Fortieth Parallel (*Professor Clarence King*). United States and Territories, showing the extent of Public Surveys, &c., 1877 (*T. W. Goad, Esq.*). 17 sheets, Government Survey of France (*Dépôt de la Guerre*). Atlas over Kongeriget Denmark (*Admiral C. Irwiner*). 6 sheets, Topographical Map of Jutland (*S.E. The Danish Minister*). Topographical Map of Sweden, 5 sheets, in duplicate. General Map of Sweden, Southern and Middle sheets, in duplicate (*Topogr. Section, Swedish General Staff*). Synchronous Charts of North Atlantic during August, 1873; Meteorology of North Atlantic during August, 1873, illustrating the hurricane of that month (*Meteorological Office*). Atlas Méthodique, par Jean Palirait, 1755 (*J. M. Foster, Esq.*). Plano de los Ferro-Carriles i Salitrcas de la provincia litoral de Tarapaca (*C. H. Wallroth, Esq.*). Sketch Map of the Road Survey of the Mackinnon-Buxton Expedition on the East Coast of Africa (*W. Mackinnon, Esq.*). Church Missionary Atlas, five parts (*Secretary of the Church Missionary Society*). Map of Greece (*Lord Arthur Russell, M.P.*). Map to illustrate the Treaty of Berlin; Cyprus, showing the administrative divisions and the identified ancient sites; Indian and Afghan Frontiers, Stanford's Map of Western Asia (*E. Stanford, Esq.*). Marine Atlas, in 2 vols. (*Sir Erasmus Ommanney, C.B.*). Carte des Voyages de Sethos (*J. M. Foster, Esq.*). Colony of New South Wales (*R. D. Adams, Esq.*). Cyprus (*Dr. H. Kiepert*). 14 sheets of Surveys of the Nile, by the Egyptian General Staff (*General Stone, Chief, Egyptian General Staff*). MS. tracing of a Map, by Commodore Goodenough, of portions of the Rewa and Wai-ni-malu Rivers (*Samuel Drew, Esq.*). Carta Geologica de Portugal (*Don Carlos Ribeiro*). Afghanistan, &c., comprising the Dooranee Empire as left by Ahmed Shah; Russian Dominions in Europe; Mapa corografico de la Provincia de Cartagena de Indias, &c. (*H. A. Kettle, Esq.*). MS. tracing of a map of the Sinai Peninsula (*Rev. F. W. Holland*). China, with MS. corrections (*E. Duffield Jones, M.A.*). Nile between Assouan and Wady Halfa (*G. Kilgour, Esq.*). Maps and General Report on the Province of Kordofan, by Major H. G. Prout (*Lieut. C. M. Watson, R.E.*). Photographs of folding boats (*Admiral McDonald*). Topographical map of the County of Berbice (*R. H. Downer, Esq.*). Topographischer Atlas der Schweiz (*The Chief of the Federal Staff, Berne*). Map showing the Explorations of Henry M. Stanley in the years 1874-77 (*Edward Weller, Esq.*). Stanford's shilling map of Afghanistan and adjoining Countries (*Librarian, R.G.S.*). Eastern and Western Hemispheres; Europe; Eastern Europe, with lettering, in modern Greek (*M. Zafiropulo*).

DONATIONS TO THE LIBRARY FROM 11TH TO 25TH NOVEMBER, 1878.—Bartlett's Canadian and American Scenery, Richardson's Fauna Boreali-Americana, vols. i. ii. iii.; Mackenzie's Voyages from Montreal to the Frozen and Pacific Oceans; Phipps's Voyage towards the North Pole; Hearne's Journey from Hudson's Bay to the Northern Ocean; Arctic Miscellanies, 1852; Travels in Egypt, &c., by C. H. Irby and J. Mangles; Barrow's Chronological History of Arctic Voyages; Lambert's Travels through Canada and the United States, 2 vols.; and Lady Morgan's Italy (*The Rev. Henry Back*). Diccionario del Peru, por M. F. Paz Soldan, 1877; Resumen de las Observaciones Meteorologicas en Lima, 1870, and Ensayo del Magnetismo terrestre en el Peru, 1869, por M. R. Paz Soldan; Estado Comercial del Amazonas Peruano, por M. Charon, 1877; Coleccion de los Tratados del Peru,

1876; Informe sobre la Expedicion a los Valles de Paucartambo, por H. Göhring, 1877; Represas para aumentar las Aguas del Rio Rimac, por V. A. Lastarria, 1876; Informe de la Exploracion de los Rios Perene y Tambo, por A. Wertheiman, 1877; Lautaro y sus Campañas, 1876, Exploracion de las Lagunas Negra, i del Eneañado, i del Valle del Yeso, 1874, and Catalogo del Museo Historico del Santa Lucia, 1875, por B. Vicuña Mackenna; Cañete, por E. Larrabure y Unánue, 1874; Apuntes sobre la Provincia de Loreto, por A. Raimondy, 1862; and Informe sobre las Minas "La Union," 1875 (*Señor Don M. F. Paz Soldan*). Copy Journal of Officer in charge of Kinta District, Perak, August, 1878 (*Librarian, R.G.S.*). Reports on Track to Macquarie Harbour, Road from Marlborough to Pieman River, and Main Line Railway, Tasmania, 1878 (*H.M. Secretary of State for Colonies*). Reports on Bhavnagar State Railway, by R. Proctor-Sims (*Author*). Life in St. Kilda, by J. Sands (*Dr. R. Brown*). Bibliotheca Americana, par C. Leclerc 1878 (*Mr. B. Quaritch*). Zeniernes Rejse til Norden, af F. Krarup, 1878 (*Author*). Spedizione Artica Svedese, di C. Negri, 1878 (*Author*). La Conquista de quince mil Leguas, and Congreso Cientifico Internacional Sud-Americano, por E. S. Zeballos, 1878 (*The Argentine Minister of War and Marine*). Lehrbuch der alten Geographie, zweite Hälfte, von H. Kiepert, 1878 (*Author*). Six Months in Ascension, by Mrs. Gill, 1878 (*Authoress*). Die Sahara, von J. Chavanne, 1879 (*Author*). Revista General de Marina, iii. Cuaderno 5 (*The Spanish Minister of Marine*). Reports on the Railways of New South Wales during 1876 (*The New South Wales Government*). Remarks on Sedimentary Formations of New South Wales, by W. B. Clarke, 1878 (*Author*). Experiences in Madagascar, by I. Richardson, 1877 (*Rev. Dr. Mullens*). Catalogue of Minerals in Colorado and On the Erupted Rocks of Colorado, by F. M. Endlich, 1878, and on the Arable and Pasture Lands of Colorado, by H. Gannett, 1878 (*Prof. F. V. Hayden*). Daniel's Lehrbuch der Geographie and Leitfaden für den Unterricht in der Geographie, edited by Dr. A. Kirchhoff (*Editor*). And the current issue of publications of corresponding Societies, periodicals, &c.

DONATIONS TO THE MAP-ROOM FROM 11TH NOVEMBER TO 25TH NOVEMBER, 1878.—Map of the County of Middlesex in the Island of Jamaica (*W. Kettle, Esq.*). A set of silver Prints of sheets 7, 8, 9, 10, 11, 12, 13, 14, 17, and 18, of Major Wilson's Map of Afghanistan (*Lord Cranbrook*). French Charts, 43 sheets (*Dépôt des Cartes et Plans de la Marine*).

DONATIONS TO THE LIBRARY FROM 25TH NOVEMBER TO 9TH DECEMBER, 1878.—The Franco-German War, 1870-71, 2nd pt., 12th section, translated by Captain F. C. H. Clarke; and Cyprus, compiled by Captain A. R. Savile (*H.M. Secretary of State for War*). Reports of the First International Meteorological Congress at Vienna on Atmospheric Electricity, &c. (*The Meteorological Office*). Catalogus Codicum Latinorum Bibliothecæ Regiæ Monacensis, ii., pt. 2 (*The Royal Library, Munich*). Real Academia Gaditana de Ciencias y Letras, Inauguracion del año 1878-79; and Obras Escogidas del Sr. F. F. Arenas, i. (*The Royal Academy of Sciences, Cadiz*). And the current issue of publications of corresponding Societies, periodicals, &c.

DONATIONS TO THE MAP-ROOM, FROM 25TH NOVEMBER TO 9TH DECEMBER, 1878.—Church Missionary Atlas, Part VI. (*Church Missionary Society*). Geografisk Atlas öfver Sverige, Serien I. and II. (*A. L. Normans*). Rand, McNally & Co.'s new Railway Map of the United States and Canada (*The Librarian, R.G.S.*). 120 Photographs taken in Damaraland and East Namaqualand by Mr. W. C. Palgrave, to accompany his report to the Cape Government (*Sir Henry Barkly*).

DONATIONS TO THE LIBRARY, 9TH DECEMBER, 1878, TO 13TH JANUARY, 1879.—The North-west Passage by land, by Milton and Cheadle, and Narrative of the Polaris Expedition, by Robeson and Davis (*Rev. H. Back*). Medical Reports, treaty ports in China, Nos. 4–11, and No. 2 of special series (*R. Hart, Esq., Inspector-General of Chinese Customs*). Bulletin of U.S. Survey of Territories, vol. iv., No. 4 (*Dr. F. V. Haylen*). Records of the Geological Survey of India, vol. xi., pt. 4 (*The Director, in name of the Government*). Report of geological survey, New Zealand, 1877–78, and Meteorological Report, 1877 (*Dr. J. Hector*). La première école de Géographie astronomique, by E. F. Berlioux (*Author*). La terra incognita dell'Egitto, by G. Schweinfurth (*Author*). Central Africa Company, prospectus with map, 1858 (*Mr. B. Quaritch*). Paläontologische Beiträge zum Briefe Danilewsky's über die Resultate seiner Reise an den Manytsch, by V. von Möller (*Author*). Die meteorologischen Beobachtungen der Gussfeldtschen Loango Expedition, by A. von Danckelman (*The German African Association*). Le Marquis de Sá da Bandeira, by R. A. Pequito (*Lisbon Geographical Society*). Specification of improved Ship-building, by E. E. Middleton (*Author*). Greek translation of Stanley's "How I found Livingstone," by A. S. Casdagli (*Author*). Meteorologische Beobachtungen, Dorpat, 1876, by K. Wehrauch (*Author*). Skizzen aus Westafrika and Reise von Okandeland, by Oskar Lenz (*Author*). Travels of Dr. and Madame Helfer, by the Countess Nostitz (*R. Bentley, Esq.*). Table of languages, East Indies, by R. Cust (*Author*). Instrucciones sobre el litoral de Valdivia entra Punta Galera i el Rio Tolté, by F. Vidal Gormaz (*Author*). Die Triangulation von Java, pt. 2, by J. A. C. Oudemans (*Author, in name of Government of Netherlands' East Indies*). Ethiopien: Studien über West-Afrika, by Dr. Hübner-Schleiden (*Messrs. L. Friederichsen and Co.*). A voyage to Spitzbergen, by J. Laing (*The Librarian, R.G.S.*). Nederlandsch Meteorologisch Jaarboek, 1873, pt. 2, 1877, pt. 1 (*The Royal Meteorological Institute of the Netherlands*). Ice in Newfoundland, by J. Milne, 1876. Remarks on the Bilious intermittent Fever of Africa, by H. Waller, 1873. On the knowledge by the Ancient Chinese, of Arabs and other Western countries, 1871, and Fu-Sang, or Who discovered America?, 1870, by E. Bretschneider. Geography in its relation to physical science, by W. Hughes, 1870; and Moas and Moa-hunters, by J. Haast, 1871 (*The Assistant-Secretary, R.G.S.*). Statistical Register of Victoria for 1877, pt. vi. (*The Victorian Government*). And the current issue of publications of corresponding Societies, periodicals, &c.

DONATIONS TO THE MAP-ROOM FROM 9TH DECEMBER, 1878, TO 13TH JANUARY, 1879.—Map of the Khaibar, Karkatcha, and Kurram Passes, by Trelawny Saunders (*E. Stanford, Esq.*). 2 Copies of a Map of the Countries of the Bible (*W. & A. K. Johnston*). 6 Reduced Ordnance Maps of Scotland, and an Agricultural Map of the County of Edinburgh (*J. Bartholomew, Esq.*). Map of Central Asia, showing Prejevalsky's Journey in 1877 (*E. Weller, Esq.*). General Map of Africa, 1879, by Keith Johnston, F.R.G.S., and one 12-inch school globe (*W. & A. K. Johnston*). 8 Sheets of Admiralty Charts (*The Hydrographer*). 4 Plans of the Island of Mauritius (*Cohen de Lissa, Esq.*). Wyld's military staff Map of Central Asia and Afghanistan, 2 copies (*James Wyld, Esq.*). Church Missionary Atlas, Part VII. (*Church Missionary Society*). Sheet 2A of the Map of the Eastern portion of South Africa, without Hills (*Quartermaster-General's Department, War Office*). Karta öfver Prävensfärd til Jenisej och åter 1875 af A. E. Nordenskiöld (*C. R. Markham, Esq., C.B., F.R.S.*).

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—General Meeting, December 18th, 1878.—In the Presidential Address it was announced that the number of members had now nearly reached 2000.—M. Charles Maunoir, the General Secretary, read his Annual Report on the Society's labours, and on the progress of Geography during the year. The meeting being the first held in the Society's own building, part of his Report was taken up by an account of the manner in which this important advantage had been gained, together with the names of those members who had most co-operated in the work.—An address was then delivered by M. de Ujfalvy on the region of the Upper Oxus. He commenced by tracing the southern frontiers of Russia in Central Asia, describing the mountainous country of Kohistan, the upper valley of the Zerafshan (country of the old Iranians, now the Galtchas), the mountains of Hissar and the independent Khauate of Karategin, which last he was of opinion ought to be occupied by the Russians, as forming part of Kohistan. Examining the strategical and commercial routes leading from Ferghana, Kohistan, and Samarcand to Herat and Kabul, he compared them with the roads taken in 1504 by the Sultan Baber, and by the Russian Mission in 1878. Baber's route was neither strategical nor commercial, consisting of paths closed for seven months of the year by snow or the melting of snow. The route from Samarcand to Herat crosses difficult deserts, and before it can be profitably used, stations must be established along it. The Russian Mission proceeded from Samarcand to Karshi, passing by Shirabad, crossing the Oxus near to Chuchka-Guzar, and reaching Kabul by way of Mezari-Sherif (a few miles distant from the ruins of Balkh) and the Bamian Pass. The passes which lead from Afghan Turkistan into the valleys of Sandjir and Ghorband, are very difficult. The great commercial highway to India passes by Herat, Kandahar, Quetta, and Shikapur, but this road is commanded by the strategic road from the Bamian to Kabul, and the Khaibar and Peshawur passes. When Russia shall have annexed Afghan Turkistan up to the Hindu-Kush, and England taken possession of the basins of the Kabul and the Helmund and the upper course of the Sari-rud, each of these two Powers will have attained its natural frontiers, and science and the peace of the world will profit thereby.—A paper was also read "On Gran Chimu and Cuzco, in Peru," by M. Ch. Wiener.

January 4th, 1879.—M. DAUBRÉE, Vice-President, in the Chair.—A telegram of the same day was read announcing that M. Rondaire had commenced his soundings in the middle of the Chott and in the neighbourhood of the Isthmus of Gabès; he had already reached depths of 13, 17, and even 30 mètres, finding always sand of more or less consistency, never rock.—It was announced that MM. de Brazza, Ballay, and Hamon of the Ogowé Expedition were on their way home with health fearfully shattered by the fatigues and privations they had undergone during their three years' explorations.—It was decided that the Society should celebrate the centenary of the illustrious English navigator, Captain Cook, on the 12th of February, the day on which he was killed by the savages of Hawaii.—A paper was then read "On the Region of the Congo," by M. de Rouve. The author resided eight years in the country. After describing the seasons and the variety of surface from Ambriz northward, he gave some details regarding the River Congo and the natives on its banks. The country, at first flat, becomes gradually hilly and varied. A French steamer, the *Tornado*, had ascended beyond Embomma as far as the cataracts a little above Noki. The natives have a certain racial affinity with Caffres, and belong to four distinct types, *Muchicongos*, *Musserongos*, *Cabindos*, and *Loangos*, distin-

guished in *physique*, customs, and mutual antipathy. M. de Rouve estimated the population of the area supplying the trade of the Congo at 12,000,000.

January 17th.—M. DAUBRÉE in the Chair. The officers of the *Commission Centrale* of the Society for 1879 were announced as—M. Daubrée, *President*; MM. Alfred Grandidier and Delesse, *Vice-Presidents*; M. Maunoir, *General Secretary*; and MM. Thoulet and Jules Girard, *Assistant Secretaries*. On the 24th January the Society is to hold a Grand Special Meeting in the Grand Hall of the Sorbonne to receive MM. Savorgnan de Brazza, Ballay, and Hamon, on their return from the Ogowé Expedition. The Society's *grande médaille d'or* will be awarded to them. A letter from Dr. Crevaux was read (*vide supra*, p. 131). M. Ujfalvy read a letter he had received from Tashkend announcing the termination of the Russian Oxus exploration. The river was found navigable throughout the whole distance (1000 miles) ascended by the Expedition, and had a current of irregular rate, reaching sometimes 5 miles per hour. It is deep and broad, the right bank being generally high and the left bank low; in severe winters it is frozen over for a great part of its course; the banks have but little wood and few inhabitants.

Geographical Society of Berlin.—November 30th, 1878: Baron von RICHTHOFEN, *President*, in the Chair. The *President* read to the Meeting extracts from two letters he had just received from the German African Society's Expedition now on its way through the interior of Angola. The first, written (August 10th, 1878) on the banks of the Lui (9° S. lat.) by one of the party, Herr P. Gierow, gave the information that the Expedition had been plundered by the Bangala tribe on the Quango, and that Herr Schütt, the leader, had turned back with the remainder of the goods that had excited the cupidity of the savages, and had sent forward Gierow to the Portuguese settlements with all the journals, collections, and instruments. On the march Gierow, having heard that his leader had been again attacked and killed, endeavoured to pass to the northward across the Quango, but was prevented by the Bangala, who, after subjecting him to gross ill-treatment, finished by again plundering the stores. Resistance was useless, and the Angola negroes who formed the escort acted with great cowardice. The other letter—from Herr Schütt himself (at M'Banza Muango, River Lui)—explained that the false rumour of his death arose from the fact that a Portuguese merchant, named Saturnino, had been shot at and wounded by the Bangala. Although thus thrown back for the time, Herr Schütt had not lost heart, and was determined to continue his exploration. Under date September 1st Schütt says: "After two months' travelling, we find ourselves again half-way between the Quango and Zanza in the country of the Bondo. In company with Saturnino, who has, like us, been driven back by the Bangala, I am about to cross the Quango, and thus open up the direct way to the north. We shall endeavour to steer our course between the Hollo and the Bangala, without contact with either tribe, as our lives are threatened. The worst is the treachery we fear on the part of our native porters. The whole of the tribes between the Quango and the coast are a pack of thieving scoundrels. I have been able to draw a tolerably correct map of the entire plateau between 8° and 10° S. lat., with all the numerous streams which flow from it." Papers were then read "On Societies of Commercial Geography and the International Congress of Commercial Geography at Paris," by Dr. Nachtigal; and "On the Recent Progress of Practical Meteorology," by Dr. Neumayer.

January 4th, 1879: Dr. NACHTIGAL, *President*, in the Chair.—The new *President*, in his opening speech, expressed the cordial thanks of the Society to the outgoing *President*, the Baron von Richthofen, for the signal services he had rendered to them and to Geographical science in general.—A letter was then read from Gerhard Rohlfs, in which he announced his departure from Tripoli for the interior in the direction of

Sogna. The arrival of a detailed report was announced from Herr C. Denhardt, engaged in exploring the River Dana. He had made a regular survey of the river for 60 miles from the mouth upwards, and a complete series of meteorological observations. A letter was read informing the Society that after much difficulty the German Minister at Peking had obtained from Prince Kung a permit to travel in Tibet in favour of Count Szechenyi, together with letters of recommendation to the mandarins there. The object of Count Szechenyi is to search for the original seat in Central Asia of the Magyar race. He intends first to travel through the provinces Shen-si and Kan-su towards Koko-Nor, and from there penetrate into Tibet or towards Lob-Nor.—Papers were read, by Prof. Förster “On the Polar Aurora,” and by Prof. Hartmann “On the African Race.”

Imperial Geographical Society of St. Petersburg.—December 25th, 1878: Baron OSTEN SACKEN, Vice-President, in the Chair.—The Secretary, M. Sreznefsky, read a paper “On the Inundation of the old bed of the Oxus, in September last.” The facts stated were these:—Owing to an unprecedented fall of snow in the winter of 1877-8 in the regions of the Upper Oxus, the river overflowed its banks to a degree unknown in the memory of the most aged of the population. Owing to the extraordinary pressure the dams in various places gave way, on the left bank, and the waters rushed over the low-lying lands, rolling onwards till they filled ancient watercourses, canals, and lake-beds. The Khan of Khiva reported that the river had burst through chiefly at three places: 1st, a few versts below Kodjeili; 2nd, near the town of Kipchak (60 versts above Kodjeili); and 3rd, 70 versts still higher up at Shahabad, near Urgendj. The whole country from Kodjeili to Khiva was under water. At the most northerly of these three places the water took two distinct courses, flowing by the desiccated Laudan Channel southwards to Kunia Urgendj, then turning to the west and filling the basin of Ak-Cheganak, which was once a bay of the now dried-up Aibugir. Here the volume of water was so great as to reach Dénkesken, more than 80 versts west of the Oxus, and continue in the direction of the Usboi, close by. Near Kipchak the torrents took a westerly course, and speeding past Mangat, they reached the Usboi, destroying the Ushak and Salan-bend dams, pouring over that of Egen-Klitch, and finally reaching the Sari-Kamysh Lakes, filling these and the saline marshes of Kak-puliar, and even extending for some distance beyond. The third or uppermost of these floods rushed through the Shahabad Canal to the Daria-lyk river-bed, and along this to the Usboi, having first united with the second outflow above described, and with it reaching Kak-puliar after a course of 200 versts along the Usboi. Later accounts (20th October) stated that the floods were subsiding.

Geographical Society of the Netherlands.—January 11th, 1879: Prof. P. J. VERH, President, in the Chair.—The proceedings opened with a discussion as to the use to be made of the balance remaining unexpended of the fund collected for the recent Expedition of the *Willem Barents*, and it was finally decided that that vessel should be employed upon a similar voyage next summer, though the project of a more important expedition at some future occasion was not abandoned. The President addressed the Meeting upon the Dutch Expedition to Sumatra, and Lieut.-Col. Versteeg, Vice-President, read an elaborate paper upon the different methods of map reproduction.

NEW BOOKS.

(By E. C. RYE, *Librarian R.E.S.*)

ASIA.

Chavanne, J.—Afghanistan. Land und Leute, mit Rücksicht auf den Englisch-Afghanischen Krieg. Wien (Hartleben): 1879, 12mo., pp. 84, map. (*Asher.*)

Fraas, O.—Aus dem Orient. II. Theil. Geologische Beobachtungen am Libanon. Stuttgart (Koch): 1878, 8vo., pp. 136, pls. (*Williams & Norgate.*)

The first portion of this work appeared in 1867, and specially referred to the geology of the Nile, the Sinai peninsula, and Syria. The present part discusses the geology of Lebanon, and is considered by the author to afford a key to a correct appreciation of the formation of the Syrian lands.

Morris, H.—A Descriptive and Historical Account of the Godavery District in the Presidency of Madras. London (Trübner): 1878, 8vo., pp. 390, map.

One of a proposed series of descriptive memoirs of all the districts of the Madras Presidency, prepared under Government direction. Its chief feature is the history of the successful scheme of irrigation carried out on Sir Arthur Cotton's plan. A general geographical and statistical account is given, with description of the principal towns, the ports of Coconada and Coringa, the natural and manufactured products (with sketches of the zoology, geology, and ethnology), ancient and recent history, education, and revenue. Tables of population, rainfall, revenue, and agricultural statistics, &c., are added. The map (scale 8 miles to the inch) is a lithograph from the Madras Survey Office, and shows the physical conditions of the district well.

Prejevalsky, N.—From Kulja, across the Tian Shan to Lob-Nor. Translated by E. Delmar Morgan. Including notices of the lakes of Central Asia. With Introduction by Sir T. Douglas Forsyth. London (Sampson Low & Co.): 1879, 8vo., pp. 251, maps.

Although the substance and much of the detail of Colonel Prejevalsky's narrative have already been placed before the public in various journals, this book will be highly valued by English geographers. Sir Douglas Forsyth's introductory chapter, partly taken from his own unpublished official narrative of the Kashgar Mission, will enable the reader to form a good idea of the special features of the regions discussed; and Mr. Morgan's appended accounts of Lakes Balkash and Ala-kul (from the Russian of Babkoff and Golubeff), and of the Lob-Nor sect of Staroversti, or "Old Believers" (from a paper in Russian by Printz, as well as personal knowledge), with his occasional notes, materially elucidate the narrative. The chief interest, however, of the volume lies in the republication in English of the analysis by Baron von Richthofen of the results of Prejevalsky's journey, and in Prejevalsky's reply (pp. 160-165), communicated direct by him to the translator. As to the difference in position between his Lob-Nor and that of the Chinese, Prejevalsky considers that the latter, judging from other instances, was probably misplaced from inaccurate information; and as to the freshness of the water, he points out that the marginal belt of stagnant and therefore salt water was probably extended over a larger area in former times, when the lake was larger, but that in its present condition the current of the Tarim keeps it sweet. His route may be briefly described as follows:—Leaving Old Kulja, he followed the Ili and Kunges rivers to the end of the Russian dominions at the N.E. of the Tian Shan range, crossing by the Narat Pass into the Chinese dominions. Following the lesser Yulduz to its source, he then struck southward to Korla, and skirted the eastern edge of the Gobi Desert, along the Tarim, exploring the limits of the shores of its first enlargement as Lake Kara-buran, and partially the second and larger lacustrine Lob-Nor, in which its course is lost. Thence, to the S.E., he reached the new

range of mountains called Altyn-tag, 14,000 feet high, his furthest point eastward being Chaglyk-bulak, on the road to Sha-chau, in about $91^{\circ} 30'$ E. long. and 39° N. lat. His discovery in this range of camels in a wild state, and his general observations upon the Avi-fauna of Eastern Turkestan, will be of especial interest to zoologists; and his accurate descriptions of the Kara-Kurchintsi and their customs are highly attractive ethnologically. The larger map, by Weller, comprises a very extensive area of 26° of longitude and 14° of latitude, of which the traveller's route occupies but a small portion. No idea of elevation as regards the Altyn-tag plateau is conveyed by the hill work, which represents isolated chains. The smaller map, from tracings by Richthofen, shows in different colours the discrepancy between Prejevalsky's lakes and those of the Chinese maps.

Rochechouart, J. de.—Pékin et l'intérieur de la Chine. Paris (Plon): 1878, 12mo., pp. 355, pls. (*Asher*.)

This volume of the popular series, 'Excursions autour du Monde,' is of slight geographical importance. The Count de Rochechouart (a Minister Plenipotentiary) visited Hong Kong, Canton, Peking, and Hankow, and travelled in various parts of the Shan Si province, claiming to be the first European who visited Woo-tai-shan, a great centre of Buddhism. No index, map, or date is given; the author's experiences are probably from ten to fifteen years old.

Schweiger-Lerchenfeld, A. von.—Armenien. Ein Bild seiner Natur und seiner Bewohner. Jena (Costenoble): 1878.

This work contains a preface by F. von Hellwald, and an appendix entitled "Anatolische Fragmente."

Sepp, J. N.—Meerfahrt nach Tyrus zur Ausgrabung der Kathedrale mit Barharossa's Grab. Leipzig (Seemann): 1879, 8vo., pp. 382, map, photographs, pls. (*Asher*.)

The author's visit was in 1874; his work is of especial archaeological and historical interest, and throws considerable light upon the ancient geography of Phœnicia.

Starchewsky, A.—Sputnik Russkavo, Tcheloveyk v' Srednei-Asie [Manual for Russians in Central Asia]. St. Petersburg (Transchel): 1878, sq. 8vo., pp. 804, double col. (*Dulau*.)

Entirely in Russian. Contains a grammar and vocabularies of the Turki, Khirgis, Tatar, Karatshai, and Tadjik dialects.

Ujfalvy de Mezö-Kövesd, C. de.—Leçon d'ouverture d'un Cours de Géographie historique et politique de l'Asie Centrale à l'École des Langues Orientales vivantes, faite le 20 Novembre, 1878. Paris (Leroux): 1878, large 8vo., pp. 20. (*Williams & Norgate*.)

A slight historical sketch, chiefly supporting the development of Russian power.

AFRICA.

Carlyle, J. E.—South Africa and the Mission Fields. London (Nisbet): 1878, 8vo., pp. 330.

Contains, among other useful matter, an authentic statement of the present number, positions, area, &c., of the mission stations of all nationalities in South Africa.

Chavanne, J.—Die Sahara, oder Von Oase zu Oase. Bilder aus dem Natur und Volksleben in der grossen afrikanischen Wüste. Wien (Hartleben): 1879, 8vo., pp. 639, map, pls., woodcuts.

A compilation of accounts of various journeys in the Sahara. The map comprises nearly the whole of North Africa, and shows the various routes and localities clearly.

Cordeiro, L.—*L'Hydrographie Africaine au XVI^e Siècle d'après les premières explorations Portugaises.* Lisbonne (Verde): 1878, 8vo., pp. 72.

A letter of the learned Secretary of the Lisbon Geographical Society to the President of the Lyons Geographical Society, in which the occasion of expressing official congratulation upon the discovery of the now celebrated Lyons globe is assumed as a base for recording a claim of the discovery of the central African lake and river systems by the early Portuguese travellers.

Danckelman, A. von.—*Die Meteorologischen Beobachtungen der Güssfeldt'schen Loango-Expedition.* Leipzig (Frohberg): 1878, pp. 83, pl.

Published under the auspices of the German African Association, and contains (after an introductory discussion of our present knowledge of African meteorology) the results as to wind, temperature, precipitation, electricity, &c., of two-and-a-half years' observations at Chinchoxo, with monthly tables of the actual observations.

Duponchel, A.—*Le Chemin de Fer Trans-Saharien: Jonction coloniale entre l'Algérie et le Soudan.* Paris (Hachette): 1879, 8vo., pp. 371, 2 maps. (*Williams & Norgate.*)

After a discussion of the general principles of colonisation and outlines of the geography, geology, climate, and productions of Algeria (with special reference to native relations), the Sahara, and the Sudan, the author notices the local difficulties in the way of a railroad across the Great Desert, and gives a technical study of the proposed route in two sections, of which the first, between Algiers and Laghouat, receives more attention than the very much longer and more difficult section between Laghouat and the Niger. The few existing railroads and their proposed extensions, &c., are shown on a map (scale 1:5,000,000), and the whole subject is illustrated by a coloured general map of Northern Africa.

Ebers, G.—*Egypten in Bild und Wort. Dargestellt von unseren ersten Künstlern.* Stuttgart & Leipzig (Hallberger): n. d., folio, plates. (*Asher.*)

This work will be completed in about 36 parts, whereof 15 have as yet come to hand. In these, old and new Alexandria, the Delta, Cairo, Memphis, &c., are elaborately illustrated and discussed in their physical, historical, ethnological, and architectural aspects.

Farley, J. L.—*Egypt, Cyprus, and Asiatic Turkey.* London (Trübner): 1878, 8vo., pp. 270.

Gussfeldt, P., Falkenstein, J., and Pechuël-Loesche, E.—*Die Loango-Expedition ausgesandt von der Deutschen Gesellschaft zur Erforschung Aequatorial-Africas, 1873-1876.* Leipzig (Frohberg): 1879, large 8vo. Erste Abtheilung, pp. 232, map, pls. (*Asher.*)

To be completed in three parts, of which the first, containing a general account and the personal experiences of Dr. Güssfeldt, is written entirely by him. The map, plotted by Dr. H. Lange, is based, as to the Loango district, upon astronomical positions fixed by Dr. Güssfeldt. It is on the scale of 1:188,000, and comprises the coast from Nyanga, 3° S. lat., to Ambriz. The illustrations of botanical subjects are exceedingly accurate and good.

Hooker, J. D., and Ball, J.—*Journal of a Tour in Morocco and the Great Atlas, with an Appendix, including a sketch of the geology of Morocco, by G. Maw.* London (Macmillan): 1878, 8vo., pp. 499, map, pls.

The expedition of which this volume contains an account, was undertaken in 1871, for botanical purposes, and naturally its chief interest is in the discussion of the flora, both as to its economic value and geographical distribution. In the latter respect, the known diversity between the vegetable productions of the country and those of the neighbouring Canary Islands, is corroborated by comparative details; but the question as to the islands forming a province separate

from the Mediterranean is left undecided, Sir J. Hooker being disposed to regard them as a very distinct subdivision only. The preponderance of Abyssinian genera and species, the considerable proportion of European plants, and the paucity of South African types are also emphasised. Mr. Ball gives some tables and remarks upon the distribution of the Atlas mountain flora, of which the general type is the Mediterranean, extending from Persia and Beluchistan to the Atlantic islands. He also contributes some tables of altitudes deduced from barometric observations, with instructions as to local correction, &c., and a compendious historical account of the geography of South Morocco, accompanied by an original map on the scale of 1:1,300,000. Compared with the French map of the *Dépôt de la Guerre*, some important corrections in the orography of the two ranges of the Atlas are at once evident, their direct parallelism being broken up, chiefly through the separation of the Anti-Atlas from the Djebel Sazherou and its direction northwards to the upper range, causing a considerable difference in the position of the head waters of the Sous River. Mr. Maw's geological observations are of a comparatively general nature, as no mineral investigations were permitted to be made; and the volume concludes with some Moorish fables, notes (by Mr. Ball) on the Shelluh language, and (by Messrs. Richardson and Brady) on the Roman remains known as Pharaoh's Castle.

Hübbe-Schleiden, W.—Ethiopien. Studien über West-Afrika. Hamburg (Friederichsen): 1879, 8vo., pp. 412, map. (*Asher.*)

The author spent two years at the mouth of the Gaboon, where he was commercially engaged, and was also for six months in the French possessions of Senegal. He discusses French colonisation and its results in West Africa, the ethnography of the region visited, African agriculture, and German civilisation. The map, by L. Friederichsen, is good, and includes the whole trade region of West Equatorial Africa, from 1° 35' N. to 2° 50' S. lat., on the scale of 1:780,000. This is also sold separately, for commercial purposes. Friederichsen gives a preliminary list of maps covering the district.

Jacollot, L.—Voyages aux rives du Niger, le Bonin, le Borgon. Paris: 1878, 12mo., pls. (*Dulaud.*)

Jedina, L. von.—Um Afrika. Skizzen von der Reise Sr. Majestät Corvette 'Helgolaud' in den Jahren 1873–75. Wien (Hartleben): 1878, 8vo., map, pls.

Lenz, Oscar.—Skizzen aus Westafrika. Berlin (Hofmann): 1878, sq. 8vo., pp. 346, map.

A collection of essays upon the natural and social aspects of Equatorial West Africa, based on the author's personal experiences during his journeys from 1874 to 1877, chiefly in the Ogowé region. The map is a mere outline of the country from Senegambia to Mossamedes.

— Reise vom Okandeland bis zur Mündung des Schebefflusses. Wien (Zamarski): 1878, 8vo., pp. 50, 2 maps.

A separate publication of the author's paper in the 'Mittheilungen' of the Vienna Geographical Society (n. f.), xi. p. 459 et seq., which contains the purely scientific results of the journeys above mentioned. The distribution of the Fan, Akelle, Arongo, and smaller tribes is discussed, and shown upon an ethnographical map. The other map gives the course and affluents of the Ogowé from 11° E. long. to the junction of the Schebe (commencing where Friederichsen's map leaves off).

Mitchell, H. L.—(Publications of the Egyptian General Staff.) Report on the seizure by the Abyssinians of the Geological and Mineralogical Reconnaissance Expedition attached to the General Staff of the Egyptian Army. Cairo: 1878, 8vo., pp. 123, map, pl.

The map is of the country between Massowah and Gura, from reconnaissances, with an approximate idea of the routes traversed in captivity.

Schaff, P.—Through Bible Lands. Notes of travel in Egypt, the Desert, and Palestine. London (Nisbet): 1878, 8vo., pp. 413, pls.

Schneider, O., and Haas, H.—Von Algier nach Oran und Tlemcen. Dresden (Schönfeld): 1878, 12mo., pp. 216.

Forms vol. iii. of the general work 'Die climatische Curort Algier,' and contains general information useful to travellers, independently of the medical aspects, especially as regards Oran and Tlemcen.

Tissot, C.—Recherches sur la Géographie comparée de la Maurétanie Tingitane. Paris (Imprimerie Nationale): 1877, 4to., pp. 186, maps, pls. (*Williams & Norgate.*)

Extracted from the 'Mémoires présentés par divers savants à l'Académie des Inscriptions et Belles-lettres.' The author, French Minister Plenipotentiary at Morocco, gives a comparative analysis of the Greek, Roman, Berber, and Arab accounts of the geography of that country, all of which are simultaneously illustrated on his first map. Further illustrations are given of the topography of the northern coast from Tangier to Tetuan, of the country between Cape Spartel and Azila, and of the Roman roads, with drawings of Phœnician walls, &c.

GENERAL, INSTRUCTIVE, HISTORICAL, &c.

Berlioux, E. F.—La première École de Géographie Astronomique, et la prochaine découverte du Pays des Garamantes. Lyon (Perin & Marinet): 1873, 8vo., pp. 30.

This academical dissertation refers to the ancient school of Alexandria; the undiscovered Garama is considered to lie probably to the south of Jebel-Harouch, S.E. of Leptis.

Bulhões, E. Lobo de.—Les Colonies Portugaises: Court Exposé de leur Situation actuelle. Lisbonne (Imprimerie Nationale): 1878, 8vo., pp. 136.

After a summary of Portuguese discovery from 1412 to 1852, a concise account is given of the present condition and administration, &c., of the six provinces remaining as Portuguese colonies, after the plan of Lopez de Lima.

Daniel, H. A.—Lehrbuch der Geographie für höhere Unterrichtsanstalten. Halle (Waisenhaus): 1878, 12mo., pp. 512.

The fact of this edition (edited by Dr. A. Kirchhoff, Professor of Geography at Halle University) being the 49th, sufficiently shows the value of the work for instructive purposes.

— Leitfaden für den Unterricht in der Geographie. Halle (Waisenhaus): 1879, 12mo., pp. 176.

This, the 125th edition, is also edited by Dr. Kirchhoff. As its title imports, it is an outline only. More than half the work refers to Europe.

Ducoudray, G.—Histoire et Géographie contemporaine, rédigées pour la classe de Philosophie. Paris: 1878, 16mo., maps. (*Dulau.*)

This new edition is written up to the end of July last.

Kaltbrunner, D.—Manuel du Voyageur. Zurich (Wurster): 1879, 8vo., pp. 762 and appendix, maps, plates, and cuts.

The author acknowledges his chief sources of information, which is on all subjects likely to be of use to scientific travellers. The work is valuable rather as an instruction book than a practical companion during exploration.

Kiepert, H.—Lehrbuch der Alten Geographie. Zweite Hälfte. Europa. Berlin (Reimer): 1878, 8vo., pp. 225-544.

Completes the work, of which the first half, referring to Asia and Africa, appeared in 1877. A most laborious undertaking, in which each country known to the ancients is discussed both as to itself and its people, with reference to its condition in different ages. The arrangement is geographical, not by authors or dates.

Krarup, F.—Zeniernes Rejse til Norden, et Tolkings Forsøg. Kjöbenhavn (Hofensberg & Traps): 1878, 12mo., pp. 32, maps.

The author's theories are that "Frislanda" of the brothers Zeni means North Friesland; that "Zichmni" is Hinrik van Siggem; that "Estlanda" means the Shetlands, "Islande" the Orkneys, "Bres" Brassa in the Shetlands, "Engroneland" the N.E. parts of Europe, "Estotilanda" the land of the Tschuds, and "Drogio" perhaps Troki; that the map of the Zeni is a forgery of the 1558 editor; that the Atlantic island Frislanda never existed; and that the Zeni never visited any part of America.

Oesterreicher, T. L. von.—Aus fernem Osten und Westen. Skizzen aus Ostasien, Nord- und Süd-Amerika. Wien (Hartleben): 1879, 12mo., pp. 422, pls. (*Asher*.)

The author, in command of the Austrian corvette *Erzherzog Friedrich*, left the harbour of Pola in May, 1874, and cruised along the coasts of Eastern Asia and North and South America, returning in June, 1876. His sketches chiefly refer to men and manners, and were for the most part published in the 'Wiener Abendpost.' The account of the circumnavigation of Borneo is more important, and appeared in the 'Mittheilungen' of the Vienna Geographical Society, 1876 (n. f., ix.), pp. 208-228.

Riese, A.—Geographi Latini minores. Heilbronnæ: 1878, 8vo. (*Dulau*.)

Schrader, E.—Keilinschriften und Geschichtsforschung. Ein Beitrag zur monumentalen Geographie, Geschichte und Chronologie der Assyrier. Giessen (Ricker): 1878, 8vo., pp. 555, map. (*Williams & Norgate*.)

Wernich, A.—Geographisch-medicinische Studien nach den Erlebnissen einer Reise um die Erde. Berlin (Hirschwald): 1878, 8vo., pp. 423. (*Williams & Norgate*.)

The results of a journey to Japan, including experiences of Saigon, Batavia, Ceylon, &c., in which all localities, customs, &c., are viewed from a medical aspect.

Wild, J. J.—At Anchor: a Narrative of Experiences Afloat and Ashore during the Voyage of H.M.S. *Challenger*, from 1872 to 1876. London (Marcus Ward & Co.): 1878, large 4to., pp. 196, map, 13 coloured pls., 169 cuts.

Dr. Wild (a member of the Civilian Scientific Staff of the Expedition), whose proficiency with the pencil is shown by the illustrations in Sir Wyville Thomson's 'Cruise of the *Challenger*,' here gives a series of coloured drawings and typographical, simple topographical and ethnographical sketches, representing as accurately as circumstances permitted, the natural scenery and inhabitants of the regions traversed, and connected by a slight narrative. Many of the subjects are necessarily new pictorially.

ARCTIC.

Gerritsz, Hessel.—(The Arctic North-East and West Passage.) Detectio Freti Hudsoni, or Hessel Gerritsz's collection of tracts by himself, Massa, and De Quir on the N.E. and W. Passage, Siberia, and Australia. Reproduced, with the maps, in Photolithography in Dutch and Latin, after the editions of 1612 and 1613. Augmented with a new English translation by Fred. John Millard, English Translator at Amsterdam. And an essay on the origin and design of this collec-

tion, by S. Muller, Fz., Keeper of the Records at Utrecht. Amsterdam (F. Muller and Co.): 1878, sq. 8vo, pp. xxvii. and 128, maps. (*Williams & Norgate.*)

This is the first time that the texts of the below-mentioned tracts on Arctic discoveries by Hudson and other explorers, edited by Gerritsz, have been printed in a collected form, with all the maps. The English translation claims to be quite new and extremely careful, that in Purchas being incomplete and incorrect. The tracts are :—‘Beschryvinghe vander Samoyeden Landt in Tartarien’ (Amsterdam, 1612), containing ‘Copie vande beschryvinge der Landen Siberia, Samoieda ende Tiugoesa,’ and ‘Een cort Verhael van de Wegen ende Rivieren nuyt Moscovia;’ ‘Verhael van seker Memoriael ghepresenteert aen zyne Majesteyt by den Capiteyn Pedro Fernandez de Quir, aengaende de bevolckinge &c., van’t vierde deel des Werelts ghenacmt Australia incognita;’ ‘Verhael vande Reyse ende de Nieuw-ghevonden Strate van Mr. Hudson’ (with map); ‘Aenmerckingen op dese Russche Caerte ende oock op de tusschen-reden die Isaac Massa by de beschryvinghe ghevoecht heeft’ (with map); and the Latin translation, ‘Descriptio ac delineatio Geographica Detectionis Freti,’ &c. (Amsterdam, 1613), with map.

Resultate der Oesterreichisch-Ungarischen Arctischen Expedition, 1872-74.—Wien (Karl Gerold’s Sohn): 1878, 4to., pp. 398, map, plates, tables. (*Williams & Norgate.*)

This forms vol. xxxv. of the ‘Denkschriften’ of the Royal Academy of Sciences of Vienna, and contains: (1) Meteorological observations and analysis of the ship’s course during Weyprecht and Payer’s Polar Expedition, with map, by Von Willerstorf-Urbair; (2) Descriptions of the Crustacea, Pycnogonidea, and Tunicata taken during the expedition, with 5 plates, by Heller; (3) Astronomical and geodetical determinations; (4) Magnetic observations; and (5) Aurora-observations, by Weypiccht, with plates; (6) Descriptions of the Cœlenterata, Echinodermata, and Vermes, by Von Marenzeller, with 4 plates.

Weyprecht, K.—Die Metamorphosen des Polareises. Lieferung i. Wien (Perles): 1879, 8vo., pp. 24. (*Williams & Norgate.*)

The commencement of a serial work on the physics of polar ice, to be completed in 10 parts, and illustrated by a map of the Arctic regions.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

THE WORLD.

Stanford’s Library Map of the World; in 4 sheets, size 5 feet by 3 feet, Mercator’s projection. 1878. (*Stanford.*)

This map shows all the chief Ports in the world, the principal Ocean Currents, their direction and rate; the Trade Winds and Monsoons; the principal Ocean Mail Routes, with average passage in days noted; the Submarine Telegraph Cables, and a Scale showing the progress of the sun’s vertical action between the Tropics. The curves of equal magnetic variation are shown on inset maps.

EUROPE.

Ramsay, Dr. A. C.—Geological Map of the British Isles; 1:729,960 or 10 geographical miles to the inch. 1878. (*Stanford.*)

Andriveau-Goujon, E.—Plan de Paris: 1:12,500 or 5·8 inches to a geographical mile. E. Andriveau-Goujon. Paris, 1878. (*Stanford.*)

Logerot, A.—Carte Générale de l’Europe, indiquant les nouvelles Divisions politiques, les Voies de Communication par les Chemins de Fer et la Navigation. 1:5,555,000 or 76·1 geographical miles to an inch. A. Logerot. Paris, 1878. (*Dulau.*)

France: Watering Places, Navigation, and Railways.—Special Map of the Watering Places (Stations Balnéaires), Navigable Waters, and Railways. Drawn under the direction of W. Karol (C. C.) by Paul Mée. Paris, 1878. Size 37 inches by 29 inches. (*Stanford.*)

This map contains a list of the mineral springs, the departments in which they are situated, their mineral distinctions, and temperatures; also a list of the coast watering-places.

Vuillemin, A.—Carte Physique et Routière des Pyrénées; 1:583,968 or 8 geographical miles to the inch. A. Vuillemin. Paris, 1878. (*Dulau.*)

Pigeonneau et Drivet.—France physique et politique: Relief du Sol, Forêts, Canaux, et Chemins de Fer. Par Pigeonneau et Drivet, Paris. 1878. 1:500,000 or 6·8 geographical miles to an inch. (*Dulau.*)

Bartholomew, J.—Reduced Ordnance Maps of Scotland. New series, 1878. Scale 1:125,000 or 1·7 geographical miles to the inch. (*J. Bartholomew.*)

The following sheets have just been issued: Glasgow and the Clyde district—Edinburgh district—Loch Lomond and Trosachs district—Upper Spey and Braemar district—Aberdeen district—Perth and Dundee district. These maps show all the roads and railways very clearly, and appear to have been especially prepared for tourists.

Richardson, Ralph, F.R.S.E.—Agricultural Map of the County of Edinburgh. Scale 1:42,500 or 1·7 inches to the geographical mile. 1878. (*J. Bartholomew.*)

This map shows by various tints of colour the value of the land for agricultural purposes.

Macaulay.—Railway Map of Great Britain, with the stations, corrected by the Companies. 16th edition. Scale 1:650,000 or 8·8 geographical miles to the inch. 1878. (*Stanford.*)

Illyne, A.—Oro-hydrographical Map of Russian Europe. (Russian character.) Scale 1:2,520,000 or 34·5 geographical miles to the inch. A. Illyne, St. Petersburg, 1878. (*Dulau.*)

Kanitz, F.—Original Karte des Fürstenthums Bulgarien und des Balkans, nach seinen eigenen Reise, aufnahmen in den Jahren 1870-74. Scale 1:420,000 or 6 geographical miles to the inch. Fries, Leipzig. 1878. (*Stanford.*)

This map also contains a plan of the southern division of the district of Sophia. Scale 1:600,000, or 8 geographical miles to the inch.

Kiepert, H.—General-Karte von Europe in 9 Blättern. Scale 1:4,000,000 or 55·5 geographical miles to the inch. 2 bericht. Aufl. Lith. und Color. D. Reimer, Berlin. (*Dulau.*)

Bonstetten, Baron de.—Carte Archéologique du Canton de Fribourg. Époque Romaine et Anté-Romaine. H. Georg, Genève. 1878. (*Williams & Norgate.*)

Austrian Government.—Spezialkarte der Österreichisch-Ungarischen Monarchie im Masstabe; 1:75,000 der Natur. 1879. (*Dulau.*)

The following sheets have just been published: Zone 4, Columns 17, 23, 25.—Zone 5, Columns 24, 25, 26, 28.—Zone 6, Columns 22, 23, 24, 25.—Zone 7, Column 23.—Zone 8, Column 27.—Zone 9, Columns 26, 28.—Zone 10, Columns 14, 15, 29.—Zone 11, Columns, 25, 28.

Kiepert, H.—Carte de l'Épire et de la Thessalie. 2 feuilles. 1:500,000 or 6·8 geographical miles to the inch. 2^{me} éd. 1878. Nouvelle édition, sans terrain. D. Reimer, Berlin. (*Dulau.*)

Tröltzsch, E. v.—Dislokationskarte der Kriegsmacht des Deutschen Reiches in Frieden. Scale 1:1,700,000 or 23·2 geographical miles to the inch. Stuttgart, 1879. (*Dulau.*)

ORDNANCE SURVEY MAPS.

*(Published since September 30th, 1878.)***1-inch scale.**

SCOTLAND: sheets 73 and 94, in outline.

IRELAND: sheets 93, 104, and 105, with hills shaded.

6-inch scale.ENGLAND AND WALES: Flintshire, sheets 2, 6, 8, 33*a* and 2*a* on one.—Denbighshire, sheet 9.—Sussex, sheets 18, 29, 42, 43, 45, 56, 57, and 59.SCOTLAND: Sutherlandshire, sheets 3, 9, 10, 17, 18, 19, 23, 26, 27, 28, 31, 35, 36, 37, 42, 43, 44, 45, 46, 47, 51, 52, 53, 54, 55, 56, 57, 62, 63, 67, 68, 69, 70, 74, 80, 85, and 99*a*: County Index Map, Caithness-shire, scale 2 miles to an inch, forming an index to the 6-inch divisions and a general map of the county.

IRELAND: Westmeath county, revised sheets, 12, 13, 14, 17, and 18.

25-inch scale.

ENGLAND AND WALES: Parish (Estate) Maps, on the scale of 1:2500 or 25·344 inches to a mile, or about 1 square inch to an acre.

Berkshire: All Hallows, 6 sheets.—Aston, Tirrold, and Blewbury detached, 1, 2, 3–8 sheets.—Blewbury, 15 sheets.—Brightwell, 9 sheets.—East Hendred and ditto detached, No. 2, 10 sheets.—East Ilsley, 8 sheets.—Little Wittenham, 3 sheets.—Long Wittenham, 8 sheets.—Sotwell, 3 sheets.—Stanford Dingley, 4 sheets.—West Hendred, 7 sheets.*Brecknockshire*: Ystradgynlais (part of), 25 sheets.*Buckinghamshire*: Aston Clinton, 15 sheets.—Buckland, 9 sheets.—Chesham, 26 sheets.—Cholesbury, 1 sheet.—Drayton Beauchamp, 9 sheets; and ditto detached, No. 1.—Great Kimble, 8 sheets.—Great Missenden, 15 sheets.—Halton, 9 sheets.—Hawridge, 4 sheets.—Lee, 4 sheets.—Little Kimble, 6 sheets.—Monks Risborough, 9 sheets.—Princes Risborough, 14 sheets.—Saunderton, 8 sheets.—Wendover, 18 sheets.—West Wycombe, 13 sheets.*Glamorganshire*: Cily-bebyll, 14 sheets.—Llanbleidlian, 11 sheets.—Llan-girog, 22 sheets.—Llantwit Major, 12 sheets.—Mancross, 6 sheets.—St. Donats, 6 sheets.—Welsh St. Donats, 9 sheets.*Carmarthenshire*: Bettws, 14 sheets.—Llandeilo-Fauz (part of), 8 sheets.—Llandybic and Llandeilo-Fauz detached, Nos. 1 and 2, 12 sheets.—Llangadog-Fauz (part of), 11 sheets.*Hertfordshire*: Ashwell, 13 sheets.—Barkway, 14 sheets.—Barley, 9 sheets.—Berkhamstead, 13 sheets.—Great Gaddesden, 10 sheets.—Great Hormead, 9 sheets.—Layston, 11 sheets.—Little Gaddesden, 7 sheets.—Little Hormead, 5 sheets.—Newnham, 5 sheets.—Reed, 8 sheets.—Rusheden, 5 sheets.—Sandon, 12 sheets.—Therfield, 12 sheets.—Throcking, 5 sheets.—Tring, 18 sheets.—Wallington, 9 sheets.—Wigginton, 7 sheets.—Wyddial, 6 sheets.*Oxfordshire*: Cliden Hampden, 5 sheets.—Crowmarsh Gifford, 4 sheets.—Nuneham Courtenay, 5 sheets.—Pishill, 5 sheets.—South Stoke, 11 sheets.—Swyncombe, 8 sheets.—Witney, 9 sheets.*Wiltshire*: Britford detached and Standlynch, 4 sheets.—Downton and No Man's Land, 24 sheets.—Durnford, 10 sheets.—Langley Wood (Ex. Par.), 4 sheets.—Odstock, 4 sheets.—Wilsford, 7 sheets.—Winterbourne, Stoke, and Maddington detached, Nos. 1, 2 and 3, 6 sheets.**Town Plans.**

ENGLAND AND WALES: Berkhamstead, scale 1:500, 6 sheets.—Chesterfield, scale 1:500, 24 sheets.—Halstead, scale 1:500, 12 sheets.—London, sheet 35, scale 1:2500.—Nantwich, scale 1:523, 7 sheets.—Neath, scale 1:500, 13 sheets.—Saffron Walden, scale 1:500, 10 sheets.

SCOTLAND: Edinburgh, revised sheets 4, 5, 6, 8, 9, 15, 16, 17, 18, and 21; ditto, new sheet, No. 13.

IRELAND: Youghal, scale 1:500.

GEOLOGICAL SURVEY MAPS.

Horizontal Sections, sheet 113.—Section No. 1, from the Carboniferous Limestone of Scalelands, Frizington, Cumberland, to the Conistone Limestone series, Stockdale Slates and Conistone Flags, on Torver Common, Lancashire. Section No. 2, from the River Duddon at Beach Dubt, south of Hall Dunnerdale, to the Conistone Limestone series, Stockdale Slates and Conistone Flags, of Broughton Moor, Lancashire. (*Stanford, agent.*)

ASIA.

India Office.—Indian Government Surveys.

Indian Atlas, quarter-sheets, 90 S.W., and 93 N.W.—Levels in the N.W. Provinces and Bengal, scale 2 miles to 1 inch, sheet 59.—Beerbhoom District, scale 1 mile to 1 inch, sheets 4 and 6.—District Hamirpur, 1872–76, scale 1 mile to 1 inch, sheets 1 and 2.—Dehra Dun and the Siwaliks, scale 4 inches to 1 mile, sheets 24, 31, 32, 36, 37, 38, 39, 43.—Kumaun and British Garhwal, scale 1 mile to 1 inch, sheets 11, 19, 27, 28.—Oudh, scale 4 miles to 1 inch; District Gondah, 1863–71; District Hurdul, 1860–66; District Seetapore, 1860–66; Gurgaon, 1873–76, scale 4 miles to 1 inch.—Index sheets of District Kurnal, 1870–73, scale 4 inches, and 1 inch to 1 mile.—Cantonment, Civil Station and Environs of Delhi, corrected up to 1873, scale 12 inches to 1 mile.—Special Survey of the Mahasu Range, Simla Extension, 1875–77, scale 6 inches to 1 mile, 2 sheets.—Bhopal and Malwa Topographical Survey, scale 1 mile to 1 inch, sheets 31, 32, 33, 34, 35, 36.—Gwalior and Central India, scale 1 inch to 1 mile, sheets 78, 81, 82.—Gwalior Fortress and City, and Morar Cantonment, 1876–77, in 4 sections, scale 6 inches to 1 mile.—City and Environs of Datia, 1864–65, scale 500 feet to 1 inch.—Guzerat, scale 1 inch to 1 mile.—Kattywar, scale 1 inch to 1 mile, sheets 47 and 48.—Mysore, scale 1 inch to 1 mile, sheets 16 and 17.—Sketch map of the Mullah's Explorations up the course of the Indus, from Anib to Bunji, and from Yassin and Mastuj to Bajaur, scale 1 inch to 12 miles, 1876.—Sketch of Reconnaissance across the Desert of Baluchistan. Made by Colonel C. M. Macgregor, C.S.I., and Captain R. B. Lockwood, Q.M.G. Department, in 1877. Based on Major O. B. St. John's map. Scale 16 miles to 1 inch. (*Stanford, agent.*)

Wyld, James.—Military Staff Map of Central Asia and Afghanistan. Scale 1 : 2,027,520 or 27 geographical miles to the inch. 1878. (*James Wyld.*)

This map is a photo-lithograph on 4 sheets, copied from the 3rd edition of Colonel Walker's map of Turkestan, with corrections and additions, taken generally from the Russian 12 sheet map of the military province of Turkestan. There are several important alterations in the topography which have not previously appeared on any map of Central Asia published in England, and it is accompanied by a concise note-book. The two southern sheets are in themselves separate maps of Eastern and Western Afghanistan.

Saunders, Trelawny.—Map of the Kaibar, Karkatcha, and Kurram Passes. Scale 1 : 1,000,000 or 13·6 geographical miles to the inch. 1878. (*Stanford.*)

Weller, E.—Map of Central Asia, showing Prejevalsky's journey in 1877. Scale 1 : 4,000,000 or 55·5 geographical miles to the inch. 1878. (*Sampson Low.*)

Kiepert, H.—Karte von Iran. Oestliche Hälfte enthaltend Afghanistan, Baluchistan und die Oezbeghischen Khanate am Oxus. Scale 1 : 3,000,000 or 41·6 geographical miles to the inch. D. Reimer, Berlin, 1878. (*Stanford.*)

This map is a compilation from the most recent English and Russian maps and route surveys.

Kiepert, H.—Special-Karte: die Landschaft zwischen Kabul und dem Indus. Scale 1 : 600,000 or 8·3 geographical miles to the inch. D. Reimer, Berlin, 1878. (*Stanford.*)

Jivselen, M. G.—Map of Russia in Asia on 4 sheets. (Russian character.) Scale 1:5,657,190 or 77·5 geographical miles to the inch. M. G. Jivselen, St. Petersburg, 1878. (*Dulau.*)

Schweiger-Lerchenfeld, Amand v.—Orographical and Botanical Map of Asia Minor. Scale 1:2,000,000 or 27 geographical miles to the inch. Size 25 inches by 19 inches. 1878. (*Stanford.*)

Stanford, E.—Map of the Countries between Constantinople and Calcutta, including Turkey in Asia, Persia, Afghanistan and Turkestan. Scale 1:7,000,000 or 96·5 geographical miles to the inch. (*Stanford.*)

Drapeyron, L.—Carte de l'île de Chypre exécutée pour la 'Revue de Géographie,' dirigée par L. Drapeyron. Scale 1:500,000 or 6·8 geographical miles to the inch. (*Dulau.*)

AFRICA.

Johnston, Keith, F.R.G.S.—General Map of Africa, constructed from the most recent coast surveys, and embodying the results of all explorations up to the present time. Scale 1:8,420,000 or 116 geographical miles to the inch. 1879. (*W. & A. K. Johnston, Edinburgh.*)

This is a 4-sheet map engraved on stone. All recent coast surveys have been taken advantage of; it shows all the political divisions in the interior of the country, as far as known, as well as the settlements or colonies on the coast, the nationalities being distinguished by various colours. The discoveries of travellers, including the most recent explorations, are carefully laid down, whilst the physical features are distinctly exhibited. The mountains have their elevations marked in English feet, and a section is given extending across the continent from Benguela to Bagamoyo. The four sheets when put together make a large map, size 52 by 43 inches.

Jourdan, Adolphe.—Carte agricole et industrielle de l'Algérie. Scale 1:1,600,000 or 21·5 geographical miles to the inch. Adolphe Jourdan, Alger, 1878. (*Dulau.*)

Quartermaster-General's Department.—Sheet 2A of the Map of South Africa, compiled and lithographed at the Intelligence Department, under the direction of Captain C. E. Grover, D.A.Q.M.G. Scale 1:633,360 or 8·6 miles to the inch.

AMERICA.

Williamson, Hon. J. A.—Map of the United States and Territories, showing the extent of Public Surveys, Indian and Military Reservation Land Grant, Railroads, Canals, and other details. Compiled from the Official Surveys of the General Land Office, and other authentic sources, under the direction of the Hon. J. A. Williamson, Commissioner, 1877. Scale 1:2,481,864 or 34 geographical miles to an inch. (*United States Government.*)

Genest, P. M. A.—Carte de la Nouvelle France, pour servir à l'Histoire du Canada, depuis la découverte jusqu'en 1760. Paris, 1878. 2 sheets. (*Dulau.*)

POLYNESIA.

Lemire, C.—Carte de la Nouvelle Calédonie, dressé d'après la grande carte marine. Scale 1:440,000 or 6·2 geographical miles to the inch. 1878. (*Dulau.*)

CHARTS.

Admiralty.—Charts published by the Hydrographic Department, Admiralty, in November and December, 1878.

No. 1590, Adriatic: Durazzo Bay; 90, Australia, north-east coast: Middleton and Elizabeth Reefs; 86, Spain, south coast: Cadiz Harbour and approaches, with enlarged plan of entrance and views; 115, Africa, east coast: Tanga Bay and approaches; 1466, A Plan of Potowmoon, pass added; 998, A Plan of Patani, roads added.

Meteorological Office.—Synchronous Charts of the North Atlantic during August, 1873. (*Meteorological Office.*)

United States Bureau of Navigation.—Atlas of Meteorological Charts of the Pacific Ocean, from the equator to lat. 45°, and from the American coast to the 180th meridian. (*United States Bureau of Navigation.*)

Dépôt des Cartes et Plans de la Marine.

No. 3567, Ports et Mouillages a la côte nord-ouest de Sumatra ; 3577, Océan Pacifique, Iles Tuamotu ; 3580, Océan Pacifique, Iles Tuamotu ; 3550, Vues de la Côte de Cochinchine ; 3559, Cochinchine, environs des Ports de Quin-Hone et de Cou-Mong ; 3569, Archipel des Marquises, Mouillages de l'île Hiva-oua ; 3571, Mer Adriatique, Canal de Morter, Ports Tajer, Lara, et Capocesto ; 3574, Port de Lussin Piccolo, Port d'Unie, S. Pietro di Nembo, Port de Dado, Port de Cherso, Canal de l'Arsa ; 3576, Mer Adriatique, Kieul, Lappontello et Berguglie ; 3583, Mer Adriatique, Port de Chioggia ; 3585, Pérou, Port du Callao ; 3523, Mer du Nord, Carte des Côtes nord du Jutland ; 3573, Plan de la Baie de Sainte Marguerite et de l'Anse du Nouveau Férolle ; 3579, Côte occidentale d'Afrique, Carte des atterrages du Cap Vert ; 3581, Côte nord d'Espagne, Baie de St. Sébastien ; 3593, Océan Pacifique, Ile Moorea, Baie de Papetoai ou de Terin ; 3597, Méditerranée, Egypte, Port Saïd, entrée du Canal de Suez ; 3598, Pérou, Iles Pescadores et Baie d'Ancon ; 3565, Delta du Tong-Kin, Carte particulière de la Rivière de Loch-nan ; 3500, Océan Pacifique, Tahiti et Moorea ; 3513, Terre-Neuve, Côte sud-est de la Baie Bull au Hâvre de Plaisance ; 3525, Carte particulière des Côtes de France ; 3537, Carte du Delta du Tong-Kin, feuille I., la Côte et les Embouchures ; 3539, Mer Adriatique, Côte orientale, de Rogosnizza à l'île Meloda ; 3540, Mer Adriatique, Côte orientale, du Canal des Sept Bouches et de Lara à Rogosnizza et à l'île Lissa ; 3551, Delta du Tong-Kin, Carte particulière des Rivières et Canaux ; 3556, Delta du Tong-Kin, Carte particulière de la Côte et des Embouchures ; 3557, Delta du Tong-Kin, Carte particulière de la Côte et des Embouchures ; 3558, Delta du Tong-Kin, Plan de l'Entrée et du Cours du Cua Cam ; 3560, Mer du Nord, Côtes ouest, du Jutland et du Schleswig ; 3561, Côte est de Patagonie, Golfe de St. Georges ; 3562, Plan de l'île Tova (Golfe de St. Georges, Patagonie) ; 3575, Mer Méditerranée, Iles de Malte et de Gozo ; 3578, Carte de la Baie Saint Jean (Côte ouest de Terre-Neuve) ; 3582, Australie (Côte sud), feuille 5, Golfe de Spencer ; 3584, Côte septentrionale d'Afrique, Golfe de Gabès ; 3587, Mer du Nord, Carte des Côtes ouest de Norvège de Udsire à Feyco ; 3588, Côte septentrionale d'Afrique, Partie comprise entre Tripoli et le Cap Misatah ; 3592, Côtes occidentales d'Afrique, Carte particulière de la Baie de Gorée ; 3595, A and B, Mer du Nord, Carte des Côtes de Norvège de Stalt à Harö ; 3568, Mer Adriatique, Côte orientale, d'Antivari à l'entrée de la Riv^{re} Vojuzza ; 3566, Mer Adriatique, Côte orientale, de Pola au Canal des Sept Bouches, Golfe de Quarnero.

EDUCATIONAL MAPS AND GLOBES.

Johnston, W. & A. K.—The Countries of the Bible, on 2 sheets, by W. & A. K. Johnston, 1878. Scale of large map (No. 1) 1:4,323,705 or 59·5 geographical miles to the inch.

On this is shown in separate maps—

No. 1. The Countries of the Bible, combining the Old Testament with the New Testament.—No. 2. Arabia and Ethiopia, &c.—No. 3. Supposed situation of Eden.—No. 4. Supposed site of the Garden of Eden.—No. 5. Mount Horeb.—No. 6. Ancient Jerusalem.—No. 7. Modern Jerusalem.—No. 8. Distribution of Nations after the Deluge.—No. 9. Distribution of the Sons of Canaan and their Descendants.—Also No. 10. The World as known to the Hebrews.

Adami-Kiepert.—Schul-Atlas in 27 Karten, v. H. Kiepert. 7th edition. D. Reimer, Berlin, 1879. (*Dulau.*)

Kampen, A. v.—Descriptiones nobilissimorum apud classicos locorum. Series I. Quindecim ad Caesaris de Bello Gallico Commentarios tabulæ. Part I. Gottha, 1878. (*Dulau.*)

This promises to form a very cheap and interesting collection of classical maps for students.

Stanford, E.—Stanford's School Map of Europe; size 58 inches by 50, scale 65 miles to 1 inch. 1878.

New edition, showing the alterations effected by the Treaty of Berlin, and marking all submarine telegraphs, &c., to the present date. (*Stanford.*)

Stanford, E.—Stanford's School Map of Africa; size 50 inches by 58, scale 118 miles to an inch. 1878. (*Stanford.*)

New edition, including the most recent alterations, notably the course of the Congo River, as mapped by Mr. H. M. Stanley.

Wilson, Dr. A.—Chart of the World, on Mercator's projection; size 54 inches by 46 inches. (*W. & A. K. Johnston.*) 1878. Showing the zoo-geographical regions according to A. R. Wallace, by Dr. A. Wilson, with Handbook.

Hachette et Cie.—Carte d'Europe écrite en 4 feuilles. Paris, 1878.

This map is printed in colour, with graduated tiuts, indicating the contours to facilitate the study of Physical Geography; size 3 feet 5 inches by 3 feet 8 inches. (*Hachette.*)

Johnston, W. & A. K.—Map of Palestine; size 50 inches by 42 inches. (*W. & A. K. Johnston.*) 1878.

Johnston, W. & A. K.—18-inch globe with mahogany stand. 12-inch, with low black stand. (*W. & A. K. Johnston.*) 1879.

These globes are corrected up to date, and being printed in colours, are very bold and distinct.

ATLASES.

King, Clarence.—Geological and Topographical Atlas, accompanying the Report of the Geological Exploration of the Fortieth Parallel, made by authority of the Honourable Secretary of War, under the direction of Brigadier and Brevet Major-General A. A. Humphreys, Chief of Engineers, U.S.A. By Clarence King, U.S. Geologist in charge, 1876. (Julius Bien, lith.) (*Engineer Department, U.S.A.*)

The following are the particulars of this Atlas:—

Upon a general sketch-map of the Cordilleras of the Western United States, drawn on a scale of 60 miles to 1 inch, are indicated the geographical boundaries of the five maps of the Geological Exploration of the Fortieth Parallel. This series forms a continuous belt from longitude 104° to the meridian of 120° W., lying along or near the fortieth parallel, and stretching from north to south 107 miles. The maps are constructed on a scale of 4 miles to 1 inch, each having its own independent projection.

The geological maps have been made upon the grade-curve foundation by the Geologist in charge, S. F. Emmons, and Arnold Hague; geological sections at bottom of geological maps by Arnold Hague and S. F. Emmons; general geological sections by the Geologist in charge.

Topographical field and office work was executed under the direction of the Geologist in charge, by Jas. T. Gardner, Asst. in charge of geodesy, A. D. Wilson, F. A. Clark and H. Custer, topographers; hill drawing by F. von Leicht; Cordillera sketch-map by F. Freyhold. Grade-curves forming the basis of geological maps represent three hundred feet vertical intervals, and they serve to convey the amount of topographical information obtained by this exploration.

CONTENTS:—Sketch-map of the Cordilleras of the Western United States. *Geological Series.*—I. Rocky Mountains. II. Green River Basin. III. Utah

Basin. IV. Nevada Plateau. V. Nevada Basin. *Topographical Series*.— I. Rocky Mountains. II. Green River Basin. III. Utah Basin. IV. Nevada Plateau. V. Nevada Basin; and *General Geological Sections*.

Hayden, Dr. F. V.—Geological and Geographical Atlas of Colorado, and portions of the adjacent Territory, by F. V. Hayden, U.S. Geologist in charge, 1877. (Julius Bien, lith.) (*U.S. Geological and Geographical Surveys of the Territories*.)

This Atlas is composed of two series of maps: the first, of four sheets, on a scale of 12 miles to 1 inch, each covering the whole State of Colorado; the second, of twelve sheets (six topographical and six geological, of identical areas), on a scale of 4 miles to 1 inch, each sheet embracing $2\frac{1}{2}$ degrees of longitude, and $1\frac{1}{2}$ degree of latitude, the whole presenting the results of the field work of 1873-74-75 and '76, covering the entire State of Colorado and adjacent portions of Utah, Arizona, and New Mexico. The position of these sheets is indicated on the general geological map. The projection of the second series is that of a secant cone, and is so constructed that they may be joined together as one map. Contours represent, approximately, 200 feet vertical interval. A statement of the method of geographical work, together with the mathematical basis, will be found in the Annual Report of this Survey for 1876. The work of primary triangulation was carried on by J. T. Gardner, from 1873 to the autumn of 1875, and was completed by A. D. Wilson. The preparation of the coloured sheets and the general supervision of their publication was entrusted to W. H. Holmes.

The sheets are:—I. Triangulation map. II. Drainage map. III. Economic map. IV. General Geological map. *Topographical*.—V. North-western Colorado. VI. Northern Central Colorado. VII. Central Colorado. VIII. Western Colorado. IX. South-western Colorado. X. Southern Central Colorado. *Geological*.—XI. North-western Colorado. XII. Northern Central Colorado. XIII. Central Colorado. XIV. Western Colorado. XV. South-western Colorado. XVI. Southern Central Colorado. XVII. and XVIII. Geological Sections. XIX. and XX. Panoramic views.

Walker, H. B.—Atlas of the Dominion of Canada, by H. B. Walker, 1878.

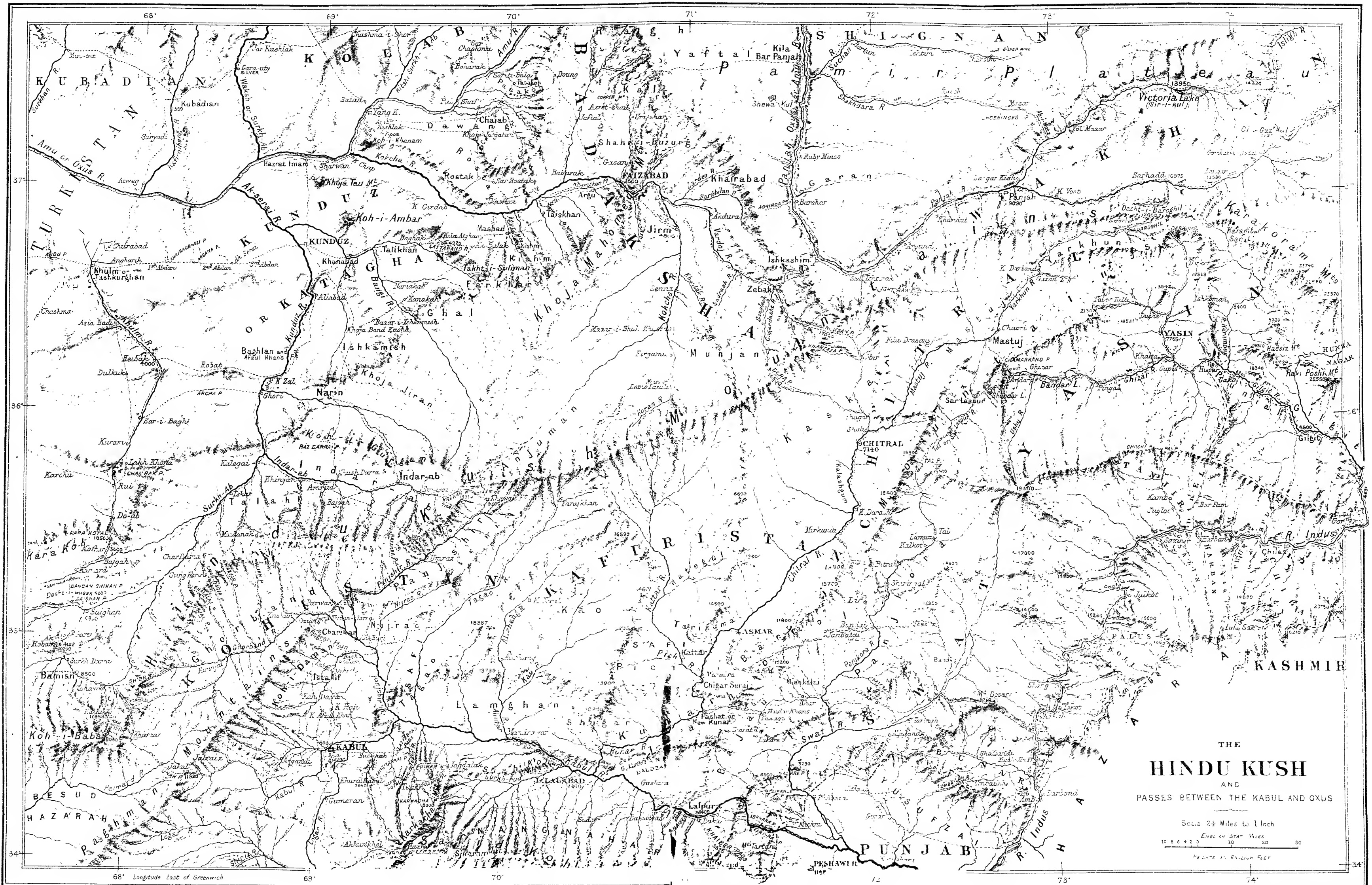
This Atlas is compiled from the latest Government maps and surveys of Canada, and contains Topographical, Geographical, Postal, Railway, and Timber-land maps, with letterpress descriptions of the Provinces, Cities, Chief Towns, and the Geology of the Dominion, besides information on other subjects too numerous to mention in this notice; to which are added maps of the United States.

Mansa, J. H.—Atlas over Kongeriget Danmark, an den omarbejdede og forbedrede Udgave. Kjöbenhavn, 1864. Corregget til 1878. (*Dulau*.)

Roth, Dr. Magnus.—Geografisk Atlas öfver Sverige of Dr. Magnus Roth. Serien I. II. A. L. Normans, Stockholm, 1878. (*Dulau*.)

Curtius—Kaupert.—Atlas von Athen, im Auftrage des Kaiserlich Deutschen Archäologischen Instituts, herausgegeben von E. Curtius und J. A. Kaupert. D. Reimer, Berlin, 1878. (*Dulau*.)

This Atlas is the result of many years' labour and the fortunate combination of various kinds of aid. In consequence of the abundance of new material, it has been thought proper to separate it from the (earlier published) seven maps on which it is based, and so it appears as an independent work. The present Atlas is intended to form the groundwork of a Handbook of the Topography and Antiquities of Athens, which will be published shortly; the accompanying text is therefore limited to what is needful in order to understand the maps and plans.



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

The Road to Merv. By Major-General Sir H. C. RAWLINSON, K.C.B.

(Read at the Evening Meeting, January 27th 1879.)

Map, p. 224.

THE south-eastern corner of the Caspian Sea has always been a region of much political and geographical interest, forming as it does a sort of half-way house between Europe and Asia. In very remote times it is probable that both the Jaxartes and the Oxus found their way by separate mouths into the Caspian Sea, for not only does Herodotus affirm that in his day the Jaxartes, or, as he called it, the Araxes, after throwing off many small arms to feed a marshy lagoon (answering to the modern Aral), entered with one stream into the Caspian Sea;* but Patrocles, the admiral of Seleucus, who surveyed the coast, actually measured the interval between what he supposed to be the mouth of the Jaxartes and the mouth of the Oxus, giving the whole distance at 80 parasangs, or 2400 stadia, equal to about 240 miles of English measurement.† Now a very remarkable illustration of the old Greek survey is afforded by the log-book of Captain Bruce, an English officer who also examined the east coast of the Caspian in a Russian vessel in 1723 for the Czar Peter, and who wrote an account of his voyage, which was published in London in 1772. In Kinderlinsk Bay, which he places at 90 versts south of Alexander Bay, he found a creek, or backwater, which he concluded to be the mouth of one of the old rivers, and which

* Herod. i. 202. The name of Araxes, answering to the modern Arras, merely signifies "the river," and may thus very well have been applied to the Jaxartes in antiquity. It is curious that in the Russian "Great Map" (Bolschoi Tschertesh), which, although put together in the sixteenth century, is known to have been compiled from more ancient materials, the river flowing from the Aral to the Caspian, and thus possibly representing the original bed of the Jaxartes, is named Arsas, which nearly reproduces the Greek Ἀραξης.

† Strabo, lib. xi. c. viii. s. 1, and c. xiv. s. 6; Plin. Nat. Hist. lib. xii. s. 30.

he accordingly named the Oxus, and at 245 versts further south he came to the mouth of a second river at Krasnovodsk Point, identified by the site of Bekovitch's Fort, which he called the Daria (" *Kizil-Darya*," or "red river" of the Persians), and which we know to be the northernmost mouth of the delta of the true Oxus. As Bruce seems to have used the old verst, which was to the new verst as 7 to 5, his interval between the two mouths of 245 versts very nearly fits in with the 80 parasangs of Patrocles, the true distance being given by the recent surveys of Karelin and Blarenberg in 1836, and of Dandevil in 1859, at about 220 English miles.* There is certainly no stream now entering the Caspian at Kinderlinsk Bay, nor do we hear of any dry bed having been traced across the Ust-Urt Plateau by Llomakin's column, which marched direct from this point to the shores of the Aral in the last Khivan Expedition; but it can hardly be doubted that both Patrocles and Captain Bruce must have heard the same story of the entrance of a great river at Kinderlinsk Bay, or have been deceived by the same appearances.†

The *Kara-Boghaz* Gulf, which intervenes between Kinderlinsk Bay and Krasnovodsk, is also a physical feature of interest. Captain Bruce found an island at the entrance 2 miles in circumference, which is not mentioned in the Russian Survey, but which certainly represents the

* The distances along the east coast of the Caspian given by Bruce are as follows:—

	Versts.
From Kulala Island, off Tup-Karaghan, to Gulf of Iskander ..	18½
Kinderlinsk Bay (River Oxus)	90
Kara-Boghaz Gulf	105
Daria River (Bay of Balkhán)	140
Ming-Kishlaq, or Ossa River (Kolneh Bazar)	60
Mouth of Asterabad Bay	150
Versts	729

Blarenberg gives the following distances:—

	Miles.
From Tup-Karaghan to Peschanin Point (Gulf of Iskander) ..	116½
Kinderlinsk Bay	83½
Kara-Boghaz Gulf	120
Krasnovodsk	100
Dervish Promontory	26½
Geuk Tepeh	70
Ak Tepeh	20
Hassan-Kuli Bay	16½
Gumish Tepeh	26½
Kara-Sú River (mouth of Asterabad Bay)	20
Miles	600

† Gosselin, in his edition of Strabo, tom. iv. p. 240, has already compared the measurement of Patrocles, with the interval between Kinderlinsk Bay and Balkhán Bay, and suggested that those two points must mark the old embouchures of the Jaxartes and Oxus respectively; but he appears not to have been aware of Bruce's independent testimony.

Caspian *Siyah-Koh*, or "black hill" of the Arab geographers, where there was in ancient times a race or whirlpool, an object of extreme dread to the tribes of the coast, and which was believed to be caused by a great "swallow" that drained off the waters of the sea into the Indian Ocean.* At present nothing of the sort is to be seen near the entrance of the Kara-Boghaz Gulf, but it has been conjectured that when the rocky ridge which now divides the gulf from the sea was first broken through, there must have been a race or rapid caused by the influx of the water flooding the low country up to the foot of the Ust-Urt Cliffs. It would seem, too, that this rapid caused by gradual flooding must have continued almost up to modern times, for Captain Bruce, who says that he sent two assistants in his largest boat to circumnavigate the gulf, found its dimensions in 1723 to be only 75 versts from north to south, by 50 versts from east to west, whereas the recent Russian Surveys give a measurement of more than double Bruce's estimate. The last report, indeed, from the Caspian head-quarters suggests that as the Kara-Boghaz Gulf is found to be navigable throughout, and to cut 150 versts into the land, the point of embarkation for Khiva should be transferred from Krasnovodsk to the south-eastern extremity of the gulf in question, whereby the route across the Steppe would be reduced from 600 to 400 versts. Reports have also been long current in the country that some of the northern arms of the Oxus drained in former times into this inland sea; and Captain Bruce thus reports as the result of his inquiries, that two large rivers, the Morga and Herat (alluding, apparently, to the Murgháb and Tejen, or River of Herat), fell into it from the east; but Dr. Lenz, in his Memoir on the Oxus, has taken great pains to correct this popular error, and to show that no stream could possibly have ever forced its way into the Kara-Boghaz Gulf from the east through the elevated Ust-Urt Plateau.

The most interesting portion, however, of the Caspian coast is no doubt the old delta of the Oxus, which may be held to commence at the Krasnovodsk Spit, and to extend nearly 100 miles to the south. The

* Yacút, about A.D. 1225, has the following description of the south-east coast of the Caspian, taken almost word for word from Istakhri:—

"As you coast along the sea-shore to the right hand from *Abuskun*, there is no single town or village, except at a place about 50 farsakhs from *Abuskun* which is called *Dehistán* (in Istakhri, *Dehistán-Basir*, for *Dehistán Bazar*?), where there is a harbour built (?) in the sea, in which the ships take refuge from the violence of the waves; and a considerable number of people are settled here from the neighbouring country occupied in fishing. They have good water." (Istakhri inserts, "And I know of no other inhabited place on this part of the coast, except at *Siyah-Koh*, where a tribe of Turks are settled, who have recently come there in consequence of a quarrel breaking out between them and the *Ghuz*, which induced them to separate and take up their quarters in this place, where they have water and pastures.") "And in this sea, in the vicinity of *Siyah-Koh*, is a race, or whirlpool, of which the sailors are much afraid, when the wind sets in that direction, lest they should be wrecked; but if there be a wreck, the sailors do not lose everything, for the Turks seize the cargoes and divide them between the owners and themselves."

entire coast-line from the promontory of *Tup-Karaghan* to this point, is rocky, with deep waters close inshore. From *Krasnovodsk* to *Astera-bad*, on the contrary, there is a low, shelving beach formed evidently of alluvial deposit washed down by the *Oxus*, the *Atreck*, and the *Gurgán*, and spread over the coast-line, so as to prevent vessels from approaching within two or three miles of the shore. A coast survey from the sea is thus almost impossible, and even from the land it is sufficiently difficult. It has been found, however, that independently of the great northern arm of the *Uzboi*, or old *Oxus*, which falls in at the head of the *Balkhán Bay*, there are two other branches of the delta to be traced more to the south, and that at the mouth of the principal arm, which falls into the *Khiva Bay*, as it is called, there are extensive mounds still retaining the name of *Kolneh Bazar*, or "the old market," and still bearing witness to the ancient importance of the locality in the gold and silver ornaments, glazed tiles, and pottery and glass that are found amid the ruins.* Here, then, I place the site of the old port, or emporium, which must always have existed at the Caspian mouth of the *Oxus*. We know on good authority (*Varro* quoted by *Pliny*, and *Aristobulus*, *Alexander's* geographer, quoted by *Strabo*†) that the Indian trade in those days came down the *Oxus* to the Caspian, crossed that sea, and ascended the *Cyrus*, was transferred by a short portage to the *Phasis*, and thus reached the *Euxine*, but there is no mention of the name of the Caspian seaports either at the mouth of the *Oxus* or the mouth of the *Cyrus*. After the *Oxus* had been diverted into the *Aral*, and when the Caspian had fallen to its lowest level, a new port was built at the embouchure of the *Gurgán*, and the commerce with India and Central Asia was thus thrown into the *Khorassán* line, the city of *Gurgán* becoming a great entrepôt of trade. This port was called *Abuskun*, or "water of *Uskun*," the latter name representing apparently the *Socana* of *Ptolemy*, whether that title referred to the *Atreck* or to one arm of the delta of the *Gurgán*; and the site is marked by the present ruins of *Gumish Tepeh* or "silver mound," from which point commences the great bulwark against the *Turks*, now called *Kizil Alan*, or "the red wall," which stretches in a line of mounds from the sea to the mountains, a distance of over 150 miles.‡ *Abuskun* is described by the geographers of the tenth and eleventh centuries as a most flourishing place;§ but in the thirteenth, or

* *Dr. Lenz*, in his *Memoir on the Oxus*, pp. 40 and 41, quotes *Blaremborg* and *Karelin* for this account of the ruins at the old mouth of the river.

† *Plin. Nat. Hist.*, lib. vi. s. 19, and *Strabo*, lib. xi. c. ix. s. 4.

‡ This wall was believed in genuine Persian tradition to have been built by the Sassanian king *Firoz*, against the *Kiyátch* (see *Hamza Isfaháni*, p. 41), but vulgar belief connected it with the famous wall of *Alexander* at *Derbend*, west of the Caspian, pretending that it could be traced under water across the sea.

§ The distance between *Abuskun* and *Gurgán* is variously stated; by *Yacút*, after *Istakhri*, at 24 farsakhs, or three days; by *Mokadassi* at a single stage. The true distance is about 50 miles. *Kharism Shah*, pursued by the *Tartars* after the destruction of *Urgenj*, died at *Abuskun* in A.D. 1221. See *Ibn Athir*, vol. xii. p. 241.

at any rate early in the fourteenth century it was submerged, owing to the level of the Caspian having been raised by the influx of the Oxus waters, a change which seems to have been brought about by the engineering works of the Tartars at the siege of Urgenj, in A.D. 1221, when the city walls were destroyed by an irruption of the river, the dams being all purposely broken, and the stream having thus found its way into the old bed, now called the Uzboi, which had been deserted for at least 700 years.* The passage from Hamdullah, the Persian Eratosthenes, who wrote in about A.D. 1325, describing this physical change, is so important that I shall quote it at length, merely remarking how strange it is that a statement of such high authority should have been overlooked in the long Oxus controversy which has been maintained by geographers from the date of Eichwald and Ritter and Humboldt to the present day. After describing the general geography of the Caspian, he says:—

“This sea contains about 200 islands, more or less, the principal of which used to be *Abuskun*, which is now submerged, owing to the Jihun, which formerly emptied itself into the Eastern Sea, towards the country of Yajuj and Majuj (Gog and Magog—this is the usual description applied to the Aral), having been diverted from its old course about the time of the rise of the Moghuls, and directed into this sea. As the Caspian has no connection with any other sea, the dry shores have thus been submerged, and this gradual submersion will continue until the consumption and influx of water become equal” (that is, until the volume of water brought in by the rivers is counterbalanced by the evaporation over the whole surface of the sea).

Observations on the level of the Caspian have not been recorded with sufficient accuracy, either in ancient or in modern times, to enable us to determine an average rate of rise and fall, according to the influx or diversion of the Oxus waters; but in a general way we can see that there must always have been such a fluctuation of level, and the same principle is in actual operation at present. The sea must have been at a very low level when Abuskun and the great wall were first commenced, if it be true, as the Russian Surveys report, that remains of masonry along the line of the wall can be traced below water 18 miles from the shore.† At any rate we see from Hamdullah's evidence that

* There has been much discussion as to the truth of this explanation of the change of the course of the Oxus in A.D. 1221; Ibn Athir's account of the siege of Urgenj, obtained from eye-witnesses in the Tartar army, is therefore of interest:—“Afterwards they (the Tartars) opened the dam which shut out the Jihun water from the city, and the river burst in and submerged the city entirely and destroyed the buildings, so that the site became a lake; and there was not a single individual saved from the place. In other cities always some portion of the inhabitants were saved. There were some who concealed themselves, others who fled betimes, others who broke out and got away, and others who carried their lives into the slaughter and yet escaped; but in Kharism, those who escaped from the Tartars were drowned in the flood or buried in the ruins; so that the whole place became a howling wilderness.” For Ibn Khaldun's authority to the same effect, see ‘Not. et Ext. des Man.,’ tom. xiii. p. 290.

† “Karelin, on political grounds, in 1835, recommended the erection of a fort at Gumish Tepeli (Silver Mound), on the north side of the mouth of the Gurgán River. This

Abuskun was submerged little more than 100 years after the Oxus had resumed its way into the Caspian; and it still remains for the greater part under water, although the sea had been drying up for almost 300 years.* When Abuskun was ruined the Gurgán port of entry was transferred to *Nim-Mardán*, a few miles south of the embouchure; later on, *Alhom*, at the entrance of the Bay of Asterabad, became the rendezvous of shipping, and now the Russians, who have almost monopolised the trade in this quarter, make use both of *Ashurada* and *Chikishlar*, the latter of which, however, is a mere open roadstead, while the former has but indifferent anchorage, and no convenience for landing or shipment. At Krasnovodsk there is deep water close in-shore, but the place suffers much from the defective state of the springs and wells, drinking water for the garrison being brought by an aqueduct from the Balkhán Hills, distant 40 or 50 miles. Recently, however, some improvement has been effected by sinking deeper and better wells. The old port which is described by the geographers, was probably at *Kohneh Bazar*, as it is placed at the distance of 50 farsakhs, or some 150 miles from *Abuskun*, and is stated to be an inconsiderable place, inhabited by a few fishermen, indifferently supplied with water, and with a shallow coast in the neighbourhood, but affording a convenient refuge to ships in bad weather. The name appears to read in the MS. of Istakhri as *Dehistán Bazar*, "the *Dehistán* market," but the orthography is doubtful. In the vicinity of *Kohneh Bazar* there is another site called *Cherchali*, where there are extensive ruins; and further south are two large mounds, one called *Geuk Tepeh*, or *Yeshil Tepeh*, "the green hill" of the Russian maps, and the other *Ak Tepeh*, "the white mound"; one or other of these mounds, but probably the former, that is "the green hill," marking the site of *Boheireh*, the island fortress of the kings of *Dehistán*, where the *Súl*, or ruler of the city now called by the Russians *Mestorian*, resisted the Arab invaders for six months in A.H. 93.† When Captain Bruce surveyed the coast in 1723 he found

is a mound of sand which has been formed around the ruins of an old stone wall which extended about 200 miles, almost as far as *Bijpoord*. To the west of the mound this wall is still visible for almost 18½ miles, under water along the coast."—Michell's Reports. See also Vambéry, p. 52 sqq., for an account of *Gomush Tepch* and the *Kizil Aban*.

* *Siyah-Kuh*, *Abusum*, and *Nim-Mardán* are all mentioned as islands by the geographers, pointing to a time when the sea was at a much lower level than at present. The result of the last careful measurement has been to show that the Caspian is now 25·3 metres below the Mediterranean, and 74 metres below the Aral, the slope from the Aral to the Caspian, over a direct distance of about 400 miles, and in the line of the old river bed, being, therefore, about 1 metre in 5½ miles.

† See Ibn Athir, vol. v. p. 22. As *Boheireh*, however, means "a lake," and the distance of 5 farsakhs from *Dehistán* is hardly far enough to suit the locality of the "green hill," perhaps it will be safer to identify the fortress of the "Súl" with the ruins of *Kichik-Kileh*, near Lake Bugdaili, which are also noticed in Llomakin's report. It is further to be observed that the *Dehistán* aqueduct was extended to another ruin called *Kiara-Tepch* (*díje*), or the "black mound," which, no doubt, was also a strong place of the *Súls*, though not situated on, or near, a lake.

a considerable settlement at *Ming-Kishlaq*, 60 versts south of the Krasnovodsk Spit, and which must apparently represent *Kohne Bazar*, as he says it was at the mouth of a large and deep river, "where ships might ride at anchor in great safety." This river he calls the "Ossa," possibly corrupted from the name *Uzboi*;* and he states that it was the frontier between the Uzbek region and Persia, the tradition of the country to the present day carrying the Persian limit up to the *Kizil-Su*† though the Shah has been obliged, through pressure from Russia, who is now supreme on the east coast of the Caspian, to consent to the Atreck in the lower part of its course forming the official boundary between Persian and Russian territory.

The name of *Ming-Kishlaq* requires also a brief explanation. At present the name applies to the northern peninsula of which *Tup-Karaghan* is the extreme point, but it has probably been used at different times to denote several other portions of the Caspian coast. At any rate, in Abulghazi's history, *Ming-Kishlaq* is constantly joined with *Abulkhán* (the Balkhán Hills)‡ and evidently indicates the country about the mouths of the *Uzboi*, in perfect accordance with Captain Bruce's nomenclature. The name has been generally understood as a "thousand pastures," after the analogy of *Min Bolak*, "the thousand springs," &c., but recent scholars translate the title as "the pastures of the Ming," who were the same as, or at any rate a branch of, the Nogais. I may add that the Caspian *Ming-Kishlaq* was known to the geographer Yacút, who wrote in about A.D. 1225, and who furnishes the earliest record of the Oxus having found its way to the Caspian after it had been turned into its old bed by the Moghuls at the siege of Urgenj in 1221.

"Ming-Kishlaq," Yacút says, "is a fine fortress at the extreme frontier of Kharism, lying between Kharism and Saksin and the country of the Russians, near the sea into which flows the Jihun, which sea is the *Buhar Tuharistán* (or Caspian)."

* Captain Bruce says *Ossa* or *Orrantus*, apparently confounding the Oehus, which in the old maps is sometimes called Ossa, with the Jaxartes.

† Krasnovodsk is simply the Russian translation of *Kizil-Su*, or the "red river," a name which was of great celebrity at the beginning of the last century, when it was supposed to represent a sort of Asiatic El Dorado. The real *Kizil-Su* or *Kizil-Darya*, as recorded in the history of Abulghazi, and other works of the seventeenth century, was the right-hand channel of the Oxus, which passed along at the base of the *Shakh Jeli* Hills, and was supposed to be impregnated with auriferous detritus from that range. The golden reputation of these hills is reported by all the early Oxus travellers, by Muravin and Gladishev, by Beneveni, by Meyendorf (p. 72), and even by Abbott (vol. i. p. 196), and incidentally by Vambery. How the name came to be shifted from the right-hand channel of the Oxus to the left-hand dry bed of the *Uzboi* does not at present appear, but the *qull* story certainly followed the name.

‡ "The Turcomans who occupied the frontiers of Asterabad and Khorassan, towards the frontiers of *Abulkhán* and *Ming-Kishlaq*," &c.—Abulghazi, p. 535. For full details regarding *Ming-Kishlaq*, see 'Not. et Ext. des Man.', tom. xiii. p. 288. The notice in the *Mesâlik-el-Absar*, that "Ming-Kishlaq is separated from the Jihun by the mountains of *Al-Balkan* (the White Balkan), which form the northern frontier of Khorassan," would seem to restrict the district to the Caspian sea-coast.

(A still earlier notice of the hills of Balkhán * and Ming-Kishlaq occurs in the *Canún* of Birúni, about A.D. 1020.)

The most extraordinary fact that I have noted in regard to this part of the Caspian shore is the discrepancy between Captain Bruce's description, recorded in A.D. 1723, and the present condition of the coast-line. All modern accounts agree that between the old Oxus delta and the Bay of Asterabad there is a shelving mud-beach, so shallow that fishermen can wade two or three miles out to sea, and no laden boat can approach the shore; but Captain Bruce writes:—"From Ming-Kishlaq we proceeded along a clean shore in deep water, where we could have landed with our galley on any part of the coast, and where abundance of small rivulets fall into the sea, and the country, abounding with villages, is overgrown with a great variety of fruit-trees." Nothing can be imagined more unlike the present appearance of the coast here, yet we cannot be mistaken as to the localities; for he gives the distance from Ming-Kishlaq to the entrance to the Asterabad Gulf at 150 old versts, and he was six days in performing the voyage.

Having thus briefly noticed the general features of the coast-line, I take up the geography of the interior. In former times the route from the coast proceeded, in the first instance, to the city of Gurgán, some 50 miles up the river. This was a great emporium of trade from the tenth century to the twelfth or thirteenth, the merchants from the Euxine and the Volga meeting at this point those from Central Asia and Eastern Persia.† Trade routes also radiated from Gurgán in all directions, one running due north to Dehistán and Khárisim; another east, across the Khorassán Plateau to the middle Oxus; one due south over the Elburz into Persia; and a fourth westward along the southern shores of the Caspian. I only propose now to consider the northern and eastern lines, which lead in the direction of Merv. The high road in antiquity—that which was followed by Alexander in pursuit of Bessus, and which is laid down in the 'Parthian Mansions' of Isidore of Charax—crossed the hills direct from Gurgán or Hyrcania (meaning "the land of wolves"), by Bujnoord to Nissa, passing through the province of Astabene, which still bears in the registers

* It has been generally assumed that the Barcani of the Greek geographers, who are usually joined with the Derbicæ, and placed on the Caspian at the mouths of the Oxus, represent the inhabitants of the Balkhán Hills (see Cellarius, b. ii. p. 707), but the identification is not altogether satisfactory, owing to the difference of the guttural. The Barcani should rather, I think, be compared with the *Vehrkán* or "wolves" of the Vendidad, another form of the name being Hyrcania or *Guryán*. If I could be assured that *Atreek* was an ancient name, I should wish to compare it with the Derbicæ of the Greeks; but the title is not found in any geographical authority before the time of Hamdullah, and may very possibly therefore have originated with the Moghuls.

† See a very curious account of the trade between Europe and Central Asia, passing by *Abushun* and *Guryán*, in the tenth century, which is quoted by Sprenger from Ibn Fakih and Ibn Khurdádbeh, in the Journal of the Bengal Asiatic Society for 1844.

the name of *Astawá*;* and if Northern Khorassan were in the hands of Russia, this would perhaps be the most direct and convenient route at the present day for the march of troops from the Caspian to Merv; but so long as Russia is obliged to keep to the north of the Atreck, which is the Persian frontier line, she is constrained to make the detour of *Kizil-Arvat*, the ranges immediately north of the river and its principal branches being impassable to an army.

The region between the Atreck, to the south, and the Balkhán Hills, to the north, forms the province of *Dehistán*, being so called from the Dahæ tribe, who seem to have been one of the principal clans, probably the royal clan, of the ancient Parthians.† The Parthian capital of Nissa was thus called Sauloe, or “the royal,” and the chief of the Dahæ, who dwelt in Dehistán, retained the title of *Súl* to modern times.‡ Dehistán being thus a sort of “debatable land” between Iran and Turan—that is, between the Persians and Turks—was held alternately by one race and the other. One of the late Sassanian kings, Kobad Ibn Firoz, is said to have built the city in this region, whose ruins have lately so much attracted the notice of the Russian commanders, as a frontier position between the Persians on the one side and the Turks upon the other; § and it was probably in reference to this liminary character that it took the name of Mazdurán (now corrupted in the Russian reports into Mestorian); for there is a well-known story in Persian romance which states that, according to agreement between Feridún and Afrasiáb, a certain archer,

* The capital of *Astawá* or Astabene has always been *Khatuchán*, or *Ku hán*, as it is vulgarly named, which ought therefore to represent the *Aorák* of Isidore, where the eternal fire of the magi was preserved. The resemblance between this name and the modern *Ashchád* to the north of the mountains near Nissa is probably a mere accident.

† Strabo, who in his 11th Book examines the history of the Dahæ at great length, and traces them in their various migrations, always gives the epithet of Parni to the tribes whose encampments stretched from the Caspian through the whole extent of the present Akhal Atack, and I would propose, therefore, to connect this name with the Parái (for *Parán-Koh*) Hills, which are now usually called *Kippet-Dágh* or *Kuren-Dágh*. As the Dahæ were certainly a Parthian tribe, Arsaces, the founder of the Parthian kingdom, belonging to the Dahæ-Parni (Strabo, lib. xi. c. xii. s. 4), and having thrown off the Greek yoke by their assistance, I can hardly admit the Aryan etymology of *Dasya* or *Dakya* for the name, nor can I explain the similarity of the title to that of the *Dehetes*, who colonised Samaria. It is probable that the Parthian Dahæ were the same as the *Tu-Hya* of the Chinese, who were driven by the *Yu-Chi* from beyond the Oxus westward to the Caspian at the close of the third century, B.C.; but it must remain a question whether the Tiao-Chi, whose capital was *Síli*, and who were found by the Chinese between Nissa and Dehistán in the second and fourth centuries of Christ, bore a corruption of the same name. The *Tuo-Chi* have been compared with the Tajiks, but on insufficient evidence. Ibn Athir calls the people of Dehistán governed by the *Súl*, a tribe of Turks. They were probably of the Ugric race, cognate with the White Huns.

‡ See Isidore's ‘Parth. Mans.’ I have explained my views at length on the subject of Sauloe, Chinese *Síli*, and *Súl* of the Arabs, in the ‘Proceedings of the Royal Geographical Society,’ vol. xx. p. 179 sqq.

§ We are indebted for this fact to Hamdullah, but I do not find *Dehistán* among the cities of Kobad's foundation in Háoza or the *Mujm'-el-Towárikh*.

named Arish, shot an arrow from Gurgán or Tabaristán to mark the frontier between the two empires, and that after a miraculous flight the arrow fell at a place called Mazdurán, which was henceforward acknowledged as the territorial limit. It is true that the name of Mazdurán is now, and has from the time of Ptolemy been, applied to the eastern frontier-post between Iran and Turan, near the modern Serakhs, but it would be equally legitimate to apply it to the northern boundary; and such is, I believe, the true explanation of the ruins of Dehistán bearing amongst the Turcomans of the Steppe the name of Mestorian. After the Mussulmans had driven out the pagan Turks from Dehistán, they built a famous *robát*, or "fortified caravanseraï," at this place, which became very celebrated, and often stood for the name of the city. Thus, the geographer Mokadassi, who wrote in the eleventh century, names the two neighbouring cities, now called Meshed and Mestorian, *Okhur** and *Robát*:—

"*Okhur*," he says, "is a city of the district of Dehistán, on the right of the road to Robát. There is a minaret here which can be seen from a great distance. It is surrounded by villages, twenty-four in number, Dehistán being one of the richest districts of Jurján." And again, "Robát is on the edge of the desert. The Sultan has ruined its walls, but it is a flourishing place with handsome mosques and well-filled bazaars, and pleasant dwellings and abundant produce. There is no *Jamí*, but it possesses an ancient and much venerated mosque with wooden columns. There is also a place below Robát, which resembles *Dandunikán* of Merv, where there is a mosque with a fine minaret belonging to the sect of the Traditionists, all the other mosques in the country belonging to the Hanefites."

And he further says that at Robát they told him that the river which supplied the city came from Toos (the ancient capital of Khorassán, near the modern Meshed), in evident allusion to the aqueduct from the Atreek, of which I shall presently read an account from a modern Russian report. The distance from Gurgán to Dehistán, or *Okhur*, is always given by the geographers at 24 farsakhs, equal to about 100 miles, and Mokadassi names the three intervening stages of *Robát-Ali*, *Robát-el-Amir* and *Bilamak* (?).† At Robát Dehistán, the last station named by Mokadassi, the road entered the desert, and with the exception of passing by the town of *Faráueh*—a flourishing place which must have been in the immediate vicinity of the modern *Kizil-Ardát*, and the name of which is still preserved in the Mount Paráu‡—continued to run, until the

* *Okhur* is called by Yacút the chief place of the district of Dehistán, but the name is not very often met with in history of the period.

† This part of the route is defective in all the MSS. of Hamdullah. The names appear to be: 1. Sinábar-rúd, 9 fars. (name restored to agree with the modern *Sinibar*, which may be the Sirmius of Strabo). 2. Mahomedabad, 7 fars. 3. Dehistán, 7 fars. Total, 23 fars.

‡ It is curious that Mount *Paráu*, which was formerly held by all geographers to be the culminating point of the *Kuren-Dágh* range of hills, has now disappeared from the maps. Baillie Fraser describes the locality in full detail in the 'Journal of the Royal Geographical Society,' vol. viii. p. 309, and his account of the district of *Paráu* at the foot of the hills exactly corresponds with Edrisi's description of *Faráueh*.

Moghuls turned the course of the Oxus, through a very sparsely inhabited country, all the way to Urgenj. Hamdullah enumerates 16 stages between *Dehistán* and Urgenj, making 110 farsakhs, or, according to Captain Napier's estimate for desert distances, about 500 miles.* As far as the town of *Faráweh*, each halting-place was a Robát, showing that the road lay through an entirely desert track; but beyond, on the whole route to Khiva, there are only four Robáts, the names of many of the other halting-places, such as *Khusháb*, or "the sweet water," *Karwán-gáh*, "the place of caravans," and *Minár-gáh*, "the place of the minaret," indicating traces of habitation. It is stated that Abdullah-ben-Tahir, the governor of Khorassán under the Caliph Mamún, built most of these caravan-serais to facilitate the transit between Gurgún and Khárisim. There was a famous building of this class at or near *Faráweh*, for the support of which were assigned the revenues of the large village of *Asadabád*, in Khorassán, between *Haftdar* and *Bahmenabád*;† and it was this building which has, I believe, given the name of *Kizil-Arrát* to the locality at the north-western point of the *Kippet-Dágh*, or Khorassán Mountains,‡ the true name being *Kizil-Robát*, or "the red caravanserai," as given by Baillie Fraser in an early number of the Geographical Society's Journal, before we had become familiarised with the Russian corruption of the name.§ I have not heard that the remains of this *Robát*, or of any of the others which marked the line of the high road, are still to be seen; but it is hardly likely that all trace of such elaborate buildings, with their wells and reservoirs, should have disappeared, and it is even possible that in process of time the Russians may find it to their advantage, in view to the protection and encouragement of trade, to restore them. It may now be convenient to read some Russian letters recently published in the 'Moscow Gazette,' which describe the route followed

* The route from Dehistán is thus continued:—

	Fars.		Fars.
1. Robát Gazimíni	7	Brought forward	62
2. Robát Abul-Abbas	9	10. Masál-bili(?)	6
3. Robát Abu-Táhir	7	11. Minár-gáh	7
4. Town of Faráweh	7	12. Mashk-mini	8
5. Robát Khisht-i-pukhta	8	13. Robát Miriam	9
6. Khusháb	7	14. Khárisim-i-now (or New Khárisim)	8
7. Robát Taghmaj	7	15. Halam-i-now (New Halam) ..	6
8. Karwán-gáh	7	16. Urgenj or Jurjániya	4
9. Robát Sirhang	3		—
Carried forward	62	Total	110

† Near the present fort of Abbasabad, known to all travellers. Ibn Dústeh is the authority for this statement.

‡ It is not clear to what exact portions of the range the names of *Kuren-Dágh* and *Kippet-Dágh* are now applied. Formerly the entire range was known as the *Kuren-Dágh*, which indeed is the only name used by Abulghazi, and which of course represents the Mount Coronus of Ptolemy, dividing Hyrcania from Parthia.

§ See 'Journal of the Royal Geographical Society,' vol. viii. p. 310. The whole of Baillie Fraser's article on the Geography of Northern Khorassán is well worth perusal.

by one of General Llomakin's detachments, during August and September last, in its route from the sea-coast to near Kizil-Arvát.

July 30 (August 11).

Leaving Krasnovodsk we proceeded along the shores of the Caspian, and crossing two dry beds in which the Oxus in former days emptied itself into the Caspian, a low sandy plain, separated from the coast by a chain of hillocks, is reached; this plain extends to the Silver Hill,* which is considerably lower than Hassan-Kuli Bay and the mouth of the Atreek. This portion of the Caspian shore, called the Chikishlar littoral, extends in a wide zone for nearly a whole degree between 37° and 38° latitude and 72° and 73° longitude east of Ferro, while the great and shallow expanse of water bears the name of the Chikishlar Bay. The depth of water at a distance of more than 1 verst from the shore is about $2\frac{1}{2}$ feet, and diminishes to 1 inch inshore. In fine weather, steamers stop 4 versts from the shore, and during rough weather at a much greater distance. The flat-bottomed boats of the Turcomans approach to within half a verst, and from that distance everything has to be carried on shore by hand, the water reaching to the knees.

We had to remain several days on this coast, from which we were to penetrate into the Turcoman steppe by a road which, I think, has hitherto never been described,† but which is the nearest and most practicable route to the Atreek, the bank of which, from its mouth at Hassan-Kuli Bay almost to Bayát-Hadjí, is bordered by unapproachable morasses. The road along which we proceeded runs through territory subject to Russia, and forms almost a straight line from Chikishlar to Bayát-Hadjí.

Early on the morning of the ^{22nd July}_{3rd August} we broke up our camp; our detachment advanced under the cover of infantry, Cossacks, Kirghizes, local militia, and some guns. The long line of camels, heavily laden with a large quantity of stores, stretched for a considerable distance. As we receded from the shore, the shells, which covered the ground and made it firmer, gradually disappeared, and the vehicles in the rear sank deeper and deeper into the sand. At the seventh verst the ground, instead of being formed of clean sand, now presented the appearance of a salt marsh indurated by the heat of the sun. Verdure between the low mounds is observed at intervals, and the vegetation itself proves that the soil is capable of cultivation. After proceeding about 4 versts over these salt marshes, the road again reaches a sand-bank, vegetation almost entirely disappears, and the wheels sink into the friable sand. This sand, however, does not extend for a long distance, and a depression is reached, which is surrounded on all sides by low hillocks; the ground becomes firmer, and emits under the horses' hoofs a hollow sound, which would seem to indicate a cavity under the upper crust of the soil, suggesting also the existence of a "subterranean basin." All the hollows are covered with a rich vegetation. Plants appear which plainly show the presence of water in the subsoil. A halt was made after a march of four hours along this hollow. It was near 11 o'clock; the heat and scorching rays of the sun, together with the dust and flies, had so exhausted the men that they all threw themselves down on the ground. The poor horses refused the forage, while none of us thought of food; each economised his supply of water, and only moistened his lips and throat. "Samovars" (tea urns), however, soon made their appearance, and the unharnessed camels made for the steppe, where they found forage in the shape of the high grass of the steppe. The Cossacks and Kirghizes collect this grass for fuel. No water was here given to the poor horses, as the wells were still a day's march distant. At 5 o'clock in the evening we again started, the heat had decreased,

* Gumish Tepeh or Abuskun.

† Traversed by General Llomakin, August, 1875.

but the flies, which were in myriads, continued to be very troublesome. The steppe over which the road now ran presented a livelier and more animated appearance; salines, with patches of verdure, became here and there visible; the sand was almost everywhere overgrown with grass; numerous camel tracks and roads were noticed: the soil became firmer, so that even the guns moved along easily. About 9 in the evening we reached Murat-Lar locality, where there are no wells, though, judging from the sounds which the earth emits when struck by horses' hoofs, from the surrounding vegetation, and from the temperature of the soil on a sultry day, it may with safety be asserted that water is to be found at no great depth.

Early on the following morning we continued our march, and the horses, having received a bucket of water each, advanced with greater spirits. The further we proceeded, the more verdant did the vegetation become, hillocks and undulations were now frequent, the sand disappeared, and the soil became firmer and argillaceous. About 6 versts beyond Murat-Lar, and in close proximity to the road, traces of old melon plantations and cultivated fields are visible. The Djefarbaï Turcomans, who roam in this part of the country, cultivate the ground here every year, and after gathering their harvests, remove to other camping-grounds. At one place I receded somewhat from the road, and observed clear traces of an old encampment, and also of fields cultivated by means of regular irrigation. We reached the wells at about 10 o'clock in the morning, or after a journey of five hours from Murat-Lar locality. The place where the wells are situated is called Karadji-Batyr, and represents several sandy hillocks surrounded for about a verst by friable sand. These hillocks are easily distinguishable by their contrast to the argillaceous and alluvial soil in the immediate vicinity of the wells. There are here at present twenty-seven wells, and probably as great a number abandoned, and each well gives, if properly attended to, excellent clear and cool water, especially when it is covered up and left untouched for several hours. We remained at these wells for nearly a whole day, and it was near 7 A.M. before we started further. The road took a sharp turn to the right, as though leading directly into the heart of the steppe. The traces of artificial irrigation continued for about 7 versts, and they then disappeared, appearing again about 4 versts beyond, though not in the same regular form as at the wells. About 12 versts from the wells we arrived at the gates, as it were, of an enormous wall, which bore a greater resemblance to an artificial structure than to a natural conformation of the soil. Three versts beyond this point the valley of the River Atreck appeared in sight with the river itself winding in zigzags between high and verdant banks.

To the left of the road, and on a high mound, stands a little stone edifice, which is called Bayát-Hadjí, and forms the tomb of a Mussulman who had performed the pilgrimage to Mecca. This monument gives the name to the whole of the surrounding country. There are no settlements here, but the Atabai Turcomans, who are semi-independent and semi-submissive, roam in the neighbourhood. Beyond the Atreck is the Persian frontier, and an old fortified camp, which served to protect our detachments in 1869 and 1872, stands on the bank of the river.

10th
22nd August.—We were compelled to stay at Bayát-Hadjí a whole week. I rode for a considerable distance down the course of the Atreck, and, in spite of the excessive heat of the last three months, the banks were everywhere covered with luxuriant vegetation. Large bushes, which sometimes approach the size of small trees, grow between the edge of the river and the high shelving banks. Grass grows so abundantly in the valley of the Atreck that thousands of horses might be fed there, and the quality of the grass is very good. About 10 versts below Bayát-Hadjí the banks begin to be boggy. Here a different vegetation presents itself, and with it reeds

appear, which, on being brought to the camp by the Turcomans, the horses ate greedily. About 40 versts from the mouth of the river in Hassan-Kuli Bay, the marshy zone merges into an impassable swamp or "tundra," which, from the Russian or right side of the Atreck, is connected with a salt marsh, and from the left, or Persian side, is bordered by steep heights known under the name of the Persian mounds.

Ascending the Atreck, its very steep banks gradually narrow the basin of the river, and the valley opens out again in the form of small islands in places where the Atreck during its overflow separates into two streams.

From Bayát-Hadjí we proceeded up the Atreck to "Chat" or "Chid," but the bed of the river is not seen from the road, and the steppe itself presents a picture similar to that on the road from the hills of Karadjí-Batyr to Bayát-Hadjí. We continued to advance along an excellent road, which did not, however, run in a straight line, at times approaching nearer to the river and receding from it at other places. On the first day after our departure we traversed 20 versts, and then made a halt. The head of the column had advanced a considerable distance further; the guide having mistaken the road, missed a turning to the Atreck which led to an open space on its banks, where we should have halted. Notwithstanding the 15 versts that had been uselessly traversed, the column halted about 4 versts from the Atreck on an open plain, which resembled an enormous terrace. We remained at the foot of this terrace until the following morning. The country here is very picturesque, and masses of thick "gribinchuk" border the banks, so that at midday it is quite shady. This place, at which we halted for a day and night, is called Yatchly-Olun. On the following day we again struck the old road, and having traversed about 20 versts, turned off to the Atreck, and halted until the following morning at Domakh-Olun locality. Domakh-Olun is a very convenient halting-place, and is also somewhat like a terrace, but the descent to it is tedious. The bank is steep to the water on our side, while from the Persian the river is reached by a long wide road. From this place we proceeded for 22 versts more, and halted at Chat. The road presented no extraordinary features, and runs close to the Atreck in a tortuous manner. The incline from our side, which comprises the bank of the river, is so full of depressions and holes, as to render the cultivation of this bank impossible.

About 10 versts before reaching Chat, the road turned to the left, receding from the Atreck; on the right side large "auls," or settlements, are visible at a place called Bairam-Olun (Holiday Ferry), a beautiful river-terrace animated with abundant verdure, but the descents on each side of the stream are narrow and inconvenient. The large "auls," the inhabitants of which did not fly from us (though they belonged to the Atabai tribe, who bear us no love), possess large flocks of sheep. Nearly all the shepherds had white asses of an excellent breed. At length we reached Chat. This is the most repulsive place along the whole Atreck, although, from a strategical point of view, the most important, because it is here that the River Sumbar flows into the Atreck, and the delta may, if fortified, be converted into an impregnable position. The Sumbar is that dirty stream which, uniting with the waters of the Atreck, makes the latter turbid; the water in the Sumbar is bitter salt, with a mixture of injurious salts, and its narrow stream is of a dirty green colour. We have been already a week at Chat. Fifty versts higher than Chat rise two enormous rocks out of the Atreck, forming a sharp delimitation of the geological structure of the country, as well as of the river itself. This place is called Su-Sium. Above Su-Sium the water in the Atreck again becomes clear, the bed stony, and the banks covered with a rich vegetation; the grass here grows up to one's waist, and whole copses of oak dot the surface of the country. Wild grapes also grow in abundance. Pheasants are also numerous. Unfortunately the road becomes impassable for

camels, and 10 versts further on becomes very difficult even for horses. One hundred versts beyond Chat the course of the Atreck can only be followed on foot, and to make the road practicable three months would at least be required. At the 108th verst beyond the ridge of rocks that rise perpendicularly to the Atreck, are to be seen ruins of enormous forts, which must have existed at some distant period. Their names were not accurately known. The local inhabitants call them Komnuk-Kileh, and on the right side of the Atreck they are called Oklan-Kileh.* Traces of irrigation are to be seen at this place on all the neighbouring steppes. The bank itself resembles a series of gardens, and the elevated plateau is abundantly covered with grass. It would be possible to pasture any quantity of cattle here, but wildness and desolation reign around.

For two weeks past the barometer has shown from 35° to 38° Réaumur in the shade. In the sun the temperature far exceeds 40° . In the morning there are only 14° . Rain fell only once for about half an hour in large but few drops. The sky is cloudy only in the morning, and the heat commences at midday. The wind, which covers everything with sand, is so violent, especially in the evening, that not unfrequently the tents have been broken. Even inside the tents it is necessary to use lamps for writing at night. The steppe is desolate in appearance from the dust, and the heat, flies, &c., cause no small inconvenience. Life, however, is still possible, even at Chat.

August 22 (September 3), 1878.

In my last letter I informed you that the road along the Atreck, 8 versts beyond Su-Sium, proved inconvenient for pack animals, and that it was therefore necessary to abandon the line of the Persiau frontier,† that is, the course of the Atreck, along which we had hitherto proceeded, and to strike a new road. After making the necessary surveys we turned to the left, at a place called Alun-Yak (where there is a ferry across the Atreck, 22 versts from Chat), and proceeded over the high Sugun-Dagh chain, after having crossed the ridge which exists between the Atreck and Sumbar. The Sugun-Dagh forms, together with these two rivers, a triangle, the smallest angle of which is at the point at which the Atreck receives the Sumbar, and is equal to about 48° , whilst its opposite side, that is, the line of the Sugun-Dagh, presents a distance of 50 versts. This line commences at first with a gentle ascent at Alun-Yak, and then rises steeply over an extent of 24 versts. At the foot of the most abrupt part of the ascent there are springs of excellent water; these springs are called Kabeli-Katje, and are separated from the steep ascent by a deep precipice. Strangely enough, the water in the springs is completely black, and yet its colour does not affect its taste. The particles of black mud which it holds in suspension are easily precipitated, and the water becomes quite clear. The grasses in the neighbourhood of the springs are very luxuriant, date and pomegranate trees being also found in abundance at this spot. The ascent and descent of the Sugun-Dagh, the highest point of which I estimate at 2000 feet, extends over a distance of 16 versts (10 miles); the descent terminates

* The names here given probably mean "the girl's fort" and "the youth's fort," according to the usual love legend attaching to similar localities. *Ohlán* will stand for *Oghlán*, "a boy," and *Komnuk* for some Turcoman word meaning "a girl," which I do not recognise.

† From this it would seem that the Russians really intend to claim the main stream of the Atreck for their boundary throughout its course, which, if admitted, would bring within their border the valley of *Mowí*, *Shirwán*, and even *Kuchán*, while *Bujnoord* would be immediately on the frontier. Hitherto Persia has maintained that the Atreck line of demarcation applies only to the course of the river from *Chat* to the sea. Above that point she claims as Persiau territory all the valleys watered by affluents of the Atreck on the right bank.

at the small river Chandyr, which falls into the Sumbar. There is a spring of cold and clear water, containing, however, particles of lime, at the point of junction of the Chandyr with the Sumbar. In spring, it is said that the former stream has a very rapid current, but its appearance, as we observed it in the summer, was not at all imposing.

At 25 versts from Chat we crossed over to the left * bank of the Sumbar. The country traversed by us along the right bank of this river is of a similar nature to that of the elevated steppe stretching along the Atreck; the chief features are clay, mud, sand, and deep fissures, and hillocks of various shapes, forming narrow, and oftener broad, defiles through which the road trends. There are no considerable elevations. Receding from the Atreck the soil becomes more and more barren, the vegetation scantier, and yellow in appearance, succulent grasses disappear, and prickly shrubs predominate.

The appearance of the steppe and hillocks is dreary and monotonous; no good water is to be found, that in the Sumbar being bitter and salt to the taste. Our night halt at Har-Olun was a very trying one, owing to the scarcity of good water. Commencing from the Chandyr to the point of its fall into the Atreck no drinkable water was found. This can only be explained by the circumstance that both the Chandyr and Sumbar had at this time (August) become dry in many parts of their course, and the remaining water had become impregnated with the saline soil through which these rivers flow.

At Sharol-Daú, 5 † versts beyond Har-Olun, and 1½ ‡ verst below the fall of the Chandyr into the Sumbar, we crossed over to the left bank of the Sumbar. After a very difficult passage over the river (the banks being here very high and precipitous), we continued our advance along the left bank of the Sumbar (between the Sumbar and Chandyr), and reached an elevated mountain, called Bek-Tepeh, belonging to the spurs of the Kuren-Dagh. The whole distance traversed by us along the bank from the Sharol-Daú to Bek-Tepeh is about 40 versts; the march was a difficult one, in consequence of the scarcity of water and barren soil. It was only at Bek-Tepeh that we again struck the Sumbar; the water here was rather better, though muddy, the bitter saltness of taste having completely disappeared. The course of the Sumbar at this point is more rapid, the volume of water greater, the bed harder, and the evaporation of the river less. Here we again crossed over to the right bank, and proceeded along a bad though deeply-trodden camel's path, and again reached the Sumbar, having receded from it about 10 versts, in order to strike the head of the defile, which extends between the more elevated spurs of the Kuren-Dagh, extending perpendicularly in the direction of the Sumbar. This defile, and the locality adjoining the river, is called Ters-Akon. Here we finally separated from the Sumbar, and proceeding through the waterless defiles of the Ters-Akon and through the Margo defile (belonging to the Kaplan-Dagh range), reached the ruined fort of Hadjan-Kileh. ‡

Bent-Essent, September 5 (17), 1878.

Leaving behind us the fortress of Kizil-Arvat, where our Cossacks, under Arnoldi, distinguished themselves last year in an unequal combat with the Tekehs, we crossed the undetermined though really existing line of frontier between Russian territory and the land inhabited by the Tekehs, who recognise no authority over themselves. I consider the extreme point of this line of demarcation to be the fortress of Hadjan-Kileh, which is flanked on one side by the Tekeh fort of Kizil-Arvat, and on the other by the Kara-Kileh fort; in front, then, is a line of Tekeh forts, the more important of which are Bami, Buirma, &c.

The road from the River Sumbar, which we left at Ters-Akon, to Hadjan-Kileh

* Right (?).

† 18 versts and ½ versts respectively, according to the Russian semi-official map.

‡ Usually called *Ahoju-K'ih*.

passes through long defiles formed by the spurs of the Kuren-Dagh; they are severally known under the names of Dairon, Nishik, Sund, Turugai, and Kuvmius (?). The entrances into these defiles are very narrow, and present the most dangerous places for caravans. The road winds through them along steep ascents and descents, and only two horses can proceed abreast at a time along it. The most dangerous portion of the route terminates at about 12 versts before reaching Hadjan-Kileh. It would be neither difficult nor expensive to construct a good road through these defiles; if this were done, the caravans would derive great benefit from it, and the defiles would no longer serve as hiding-places for the marauding Tekch bands. Beyond the defiles, in the direction of Hadjan-Kileh, the vegetation becomes extremely rich, and wild boar and other game are found in great abundance. In these respects the country is similar to that stretching along the banks of the Atreck.

In close proximity to Hadjan-Kileh stands an old deserted earthwork in the shape of a regular quadrangle, flanked by two conical crenellated towers, about 2 fathoms in height. The upper platforms of these are protected by a low wall, pierced with apertures for musketry firing. A similar fort, though of smaller dimensions, and with one tower only, is passed at a place 3 versts before reaching Hadjan-Kileh. This *kileh*, or "small fort," proved to be a Tekch habitation; it was surrounded by cultivated and well-irrigated fields, the water being obtained from a small rivulet, which flows through the neighbouring bushes and reeds, and ultimately reaches Hadjan-Kileh. Not far from the latter place, and in the middle of the so-called Tekch oasis, there is a fine spring, which yields an abundant supply of water, and which forms the source of the rivulet that flows on in the vicinity of the small fort, 3 versts distant from Hadjan-Kileh. At this point, from a hill on the right, is obtained a fine view of the Goklan fort of Kara-Kileh, and of the surrounding country, which is well cultivated and thickly populated. Ascending a high hill on the left, at Bent-Essent (which likewise stands high), the whole Tekch oasis presents itself to the view, dotted with numerous dwellings. On the immediate horizon is seen the fort of Bami, an awkward structure, resembling Hadjan-Kileh; beyond again appears Fort Buirma. The Tekch oasis, although producing cotton in some places, cannot be described as a fertile land; small patches of cultivated ground alternate with stretches of brushwood and dry sterile salines.

A further extract of some interest, from the 'St. Petersburg Journal' of March, 1876, may be now read, regarding the ruined cities of Dehistan:—

General Llomakin, profiting by the prolonged stay he was compelled to make near Lake Bugdailly as much by the necessity of giving his camels time to rest as by the object of finally adjusting relations with the Charva Yenuts, confirming the elders they had elected, and deciding some points of law, employed the spare time in visiting the ruins of two ancient cities, the probable relics of Kharismian times, named one Mestorian and the other Meshed, the former 36½ versts south-east of Bugdailly, and the latter 5 versts further.*

The road was easy and crossed a remarkably fertile country, the whole of which appeared well adapted for cultivation, as its name—Bugdailly—expresses, as it signifies "granary," as also does the appellation of "king of lands" given it by the natives. The soil improves the nearer one gets to the above-mentioned ancient cities,

* A full account of these ruins, as given by Arthur Conolly and Vambery, with my remarks on the history of the cities of Dehistan, will be found in the Society's 'Proceedings,' vol. xx. p. 180.

as also beyond them in the Atreck Valley. The Turcomans report that some of them have in the rainy season sown corn, maize, and djoghena* in these districts with extraordinary results; corn returning 40 or 50 fold, maize 150 to 160 fold, and djoghena as much as 200 fold; such crops could not be obtained even at Khiva, where they are exceptionally fine, owing to the overflow of the Amn-Daria, which covers the country with a fertilising mud.

Mestorian or Mestdovran must formerly have been one of the most important cities of Central Asia, if one may judge from the remarkable aqueducts leading into it, which were the chief arteries of an entire system of irrigation canals thoroughly watering the whole country, and from the number of its buildings, the remains of which exist to this day. On the road from Bugdairly to Mestorian are the ruins of a fortress named Kitchik-Kileh, consisting of a large artificial mound, on the top of which are to be seen the remains of brick walls. Continuous series of similar forts leave this point, one in the direction of Mestorian, and beyond it to the district of Chat (at the junction of the Sumbar with the Atreck), the other to Kara-défé on the Caspian, south of the Green Mound (Zelënoi-Bougor). There is reason to believe that the object of this line of forts was to protect the great aqueduct, which used to cross the steppe in this precise direction from the Atreck, by Mestorian, to Kara-défé. Concerning the aqueduct, thanks to General Llomakin's expedition, we possess the following information:—

The feeding of this vital artery of ancient Kharism was provided by the Atreck. A portion of its waters, diverted in all probability by means of a dyke established in the locality named Chat, some versts above the mouth of the Sumbar, was received into a canal, which is still to be seen, about six sagènes† broad and one ell‡ deep, which followed the southern slope of the Sugun-Dagh (a ramification of the Kuren-Dagh, dividing the valley of the Sumbar from that of the Atreck) and pursued its way to N.N.E., as far as the Sumbar, a length of about 35 versts.

Before reaching the Sumbar, the canal divided into two branches, the lower of which reached the river 6 versts above Chat, and the higher 10 versts from the same place.

The two branches crossed the Sumbar, the glen of which in this place was certainly not less than 70 sagènes in breadth (the breadth of the stream being 2 or 2½ sagènes and the steep banks not less than 14 sagènes in height), on two large stone bridges, on which were placed immense pipes made of brick. The Turcomans say that remains of these pipes may still be seen on the left bank of the Sumbar, and that they are large enough to admit the body of a man, that is to say, about an ell in diameter. On the right bank of the Sumbar, called here Gouktye, remains of these aqueducts are easily to be distinguished. The lower branch passes to the south of the mound of Dada-Goumbet, then towards the mound of Bairam Hadji-Tepeh, and is lost not far from it in a deep marsh. The upper branch crosses to the north of the mound of Dada-Goumbet, then between the heights of Dekchano and Bengdivan, and then takes a north-westerly direction for Mestorian, and Kara-défé near the Green Mound.

The course of this ancient aqueduct was carefully explored by General Llomakin's orders, and it was found that the canal, three or four ells in breadth and one ell in depth, is perfectly visible throughout its entire course, with the exception of certain spots where the sands have effaced its traces. As far as Dekchano it keeps on the sur-

* "Millet" (*Holcus spicatus*), the D'horeh of the Arabs.

† Sagène, Russian fathom, 7 feet English.

‡ Russian ell of 28 inches.

face of the ground, but beyond that, where the ground is lower, it is carried on an artificial embankment about one *sagène* in height, upon which it crosses the steppe to the Caspian Sea. There is reason to believe that the building of this embankment was for the purpose of supplying means of irrigation to the country. As a fact, a great number of lateral branches leave the canal and the embankment both north and south, and end in the direction of ancient buildings of various sizes now ruined, but which have all retained their names in the country.

This remarkable aqueduct measures from the Sumbar to Mestorian about 65 *versts* in length, from Mestorian to Kara-défé nearly 50 *versts*, and from the Atreck to the Sumbar, as we have mentioned above, nearly 35 *versts*, making a total length of nearly 150 *versts*. In 1872, Colonel Stebnitzky in descending the Atreck saw, about 40 *versts* below Chat, a canal about 5 *sagènes* in breadth, leaving the Atreck in a north-westerly direction. He was told that this canal was about 60 *versts* in length, and went to Mestorian, from which it would appear that this ancient city was supplied from several quarters at once.

Perhaps the restoration of these ancient watercourses would not be an impossibility, and would not entail any excessive expense, thanks to the application of the technical resources at the disposal of our engineers of the present day. If the works should ever be undertaken, there is reason for believing that the object would be materially assisted by the Turcomans themselves, who would have everything to gain from the re-establishment in these districts of an abundant system of irrigation, which would restore their pristine fertility.

As regards the city of Mestorian itself, judging by the ruins in existence, it consisted first of a citadel surrounded by a moat and earthen rampart, then of two other enclosures with thick high walls built of enormous bricks of more than half an ell square and of excellent quality. These enclosures were flanked by large towers at the angles and also on the sides. The citadel was in the shape of an irregular square, the sides of which measured from 300 to 500 *sagènes* in length, so that it must have occupied about a square *verst* of ground.

This space, as well as the vicinity of the citadel within a radius of 2 *versts*, was covered with remains and fragments of brick quite as good as those forming the enclosure walls. They were the ruins of the buildings and houses of the city, the foundations of which could be traced in some places. The mass of the *débris* is so considerable, and so well preserved, that it would be possible to make use of them for building a large new town. Among the edifices not entirely ruined may be mentioned the great gates of the town and the mosque of Chir-Kabir, a Mussulman saint who is still held in the deepest veneration, and to whom numerous miracles are attributed. Inside the citadel may be seen two minarets half fallen, but still measuring 13 *sagènes* in height with a diameter of 3 *sagènes* at their base; they must have had a total height of 20 *sagènes*, and had a spiral staircase in the interior. Also there were the lower walls of a building which must have been either a palace or a mosque. All the buildings were striking from their fine architecture and noble proportions; while the materials of which they are built are not less remarkable, being of brick which is as hard as stone, and often carved and ornamented with friezes in relief, arabesques, and well-executed inscriptions. The latter are sometimes in various colours illuminated with flowers, and the letters one quarter of an ell in height.

A few fruit-trees still growing in the neighbourhood testify to the existence of gardens which formerly surrounded the city. General Llomakin never expected to meet with so remarkable a city, and came unaccompanied by either artist or photographer, but, nevertheless, had some sketches taken, some of the inscriptions copied, and a plan made of the town and of the route from Bugdai to it.

Five versts from Mestorian is another remarkable place, known in the country by the name of Meshed, which was likewise visited by General Llomakin in 1875. It is strictly speaking an ancient necropolis, as may be seen by the number of chapels, tombs, memorial stones, and mosques, of which a few only are standing. Among the latter is shown the Mosque of Chir-Kabir, which to this day attracts a crowd of pilgrims; the interior is always adorned by carpets, the offerings of the Sunnees. It also contains, according to report, an open coffer holding the sacred books, a hanging lamp, and vases for ablutions, and although in a desert place and without even a Turcoman camp near, no one dreams of touching these articles, which are placed under the protection of the religious feeling of the true believers. The legend relates that the saint Chir-Kabir was an Arab, and that in his time the Mongols expelled from Russia took possession of Mestorian; following them came the Kalmucks, who displaced the Mongols, and were in their turn driven away by the Kirghiz and the Turcomans. A skull dug up from one of the tumuli near the Mosque of Chir-Kabir would seem to have belonged to an individual of the Mongol race, judging by the prominence of the cheek-bones.

It will be understood from these Russian extracts that the general character of the country, about 100 miles in breadth, between the shores of the Caspian and the hills, is desert, with very few natural springs and still fewer wells. There are no permanent habitations, and the Yemut camps even are scanty, though in the spring, and especially near the foot of the hills, the pasturage is good. The great block of mountains which bounds Khorassán to the north, and runs in a general direction of W.N.W., gradually diminishes in height as it approaches the Caspian. West of Kizil-Arvát, where the range takes the name of Kuren-Dágh, the hills, though occupying a broad belt, are of very moderate elevation, but they rise again to a height of 4000 or 5000 feet at their northern extremity, where they are known as the Lesser and Greater Balkhán. The bed of the Uzboi, which is the old Northern Oxus, passes between these ranges; but whether there is a southern bed, the continuation of the Ochus of antiquity, also traversing the Kuren-Dágh, and passing to the north-west of the ruins of Mestorian, is a geographical problem not yet solved. Arthur Conolly, in the year 1826, certainly fell in with such a river-bed, about midway between Kizil-Arvát and the Lesser Balkhán, and followed the bed through the range to the upper plateau, measuring its dimensions and describing the honey-combed and water-worn banks in full detail, and there is much evidence to be obtained, both from Abulghazi, the king of Khárisim, who wrote in the seventeenth century, and Hamdullah, and from local tradition, all pointing to the fact that the southern arm of the Oxus, answering to the Ochus of the Greeks, did really find its way in that direction; but on the other hand, the Russian commanders, who have repeatedly marched from the Balkhás to Kizil-Arvát across the bed of the supposed Ochus, absolutely ignore its existence; and on the whole, therefore, I am rather inclined to think that Conolly's river-bed could only have been formed by some sudden local inundation, the Ochus branch of the Oxus having

joined the Uzboi to the east of the Balkhán Hills, and having flowed into the Caspian in that channel.*

I will now enter on some details in regard to the road to Merv. The Russians make use indifferently of both the lines which lead from the Caspian to the eastward, and which unite at Kizil-Arvát. The northern line, after skirting round the Bay of Balkhán, and crossing the Uzboi at the Aidin well, follows along the northern base of the Kuren-Dágh, all the way to Kizil-Arvát. Captain Napier, whose report on

* The heads of the argument drawn from ancient and modern sources in favour of there having been an old southern arm of the Oxus, or Ochus, have been given by me in the Society's 'Proceedings,' vol. xx., as already quoted, but I would now desire to place on record some further evidence all bearing in the same direction. A good deal must depend on the previous establishment of the existence of a city of Balkhán in the desert north-east of Kizil-Arvát, for, if there ever was such a city, there must have been a branch of the great river to feed it. The geographer Mokadassi then, in discussing the early history of Khárisim, says that in antiquity the Jihúu flowed to a town behind Nissa called *Balkhán*, but that a canal having been opened from the river to convey water northward to *Kát*, the stream rapidly drained off in that direction, leaving *Balkhán* waterless and ruined. Yacút in the same way, following probably Mokadassi, notices *Balkhán* as a city behind Abiverd; and Ibn Athir (vol. ix. p. 267), in describing the flight of the *Ghur* from Nishapoor to Dehistán before the arms of the Mahmúd of Ghazni, says that they took refuge in the hills of *Balkhán*, where was the ancient Khárisim. But if there was a great city anciently in this locality, we need not any longer puzzle over the geographical difficulty in the Vendidad, which places Nissa between Merv and *Bakhti*, for the *Balkhán* of the Ochus would exactly suit that indication, while Bactria is quite out of place, and its capital, moreover, *Balkh*, was a Buddhist city, where Zoroastrianism probably was, but very partially, admitted. This, then, would explain why the name of *Khárisim*, very celebrated in Magian tradition as the district where the eternal fire of *Jamshid* was preserved, is not mentioned in the Vendidad, though cited in a hymn to Mithra. In the Zoroastrian scheme *Bakhti* would represent the Southern Oxus, as *Urván*, or *Urgenj*, represented the Northern Oxus, *Khárisim* merely denoting the tribe—of Aryau origin, though classed by Strabo and Quintus Curtius with the Dahæ and Massagetæ—which in the time of Alexander dwelt along the Ochus, but migrated to the northward when the river changed its course. The Chorasmii are also classed both by Pliny and Ptolemy with the Candari, and *Kandur* was the old name of Bikand, near the point of the Oxus bifurcation. This district of Bikand, again, seems to represent the Fa-ti of the Buddhist Pilgrim, west of *Pou-ho* or Bokhara; and south-west of *Fa-ti*, at 50 miles distance, was *Ho-li-si-mi-cia*, undoubtedly *Khárisim*, a name which must, it would seem, have thus applied in the seventh century to the valley of the Ochus, rather than to that of the Northern Oxus (see Julien's 'Hiouen-Tsang,' tom. i. p. 22). The only other item of evidence that I will cite is a passage in the "Book of the Great Map" (Bolschoi Tschertesh of the Russians), which, following some ancient tradition, notices a river opposite to Bokhara, named the *Ugus*, which fell into the Caspian after a course of 1000 versts, and was quite independent of the Northern Oxus. The resemblance of the Russian *Ugus* to the Oguz of Napier is striking, and may very possibly represent the name written *Oxos* by the Greeks. I will only further say that, though it is quite possible the moving sand-hills of the Khivan desert may have covered the ruins of *Balkhán* and have obliterated all traces of the upper bed of the Ochus, yet that will not explain the absence of any such channel through the ridge of high land between *Kizil-Arvát* and *Moola-Kári*: and if the Russian surveyors therefore report decisively on this point, as it is said they do, we must accept the explanation that the Oguz joined the Uzboi to the east of the Balkhán Range, and that Arthur Conolly's river has no real existence in geography.

Khorassán was published in vol. xlv. of the Royal Geographical Society's Journal, says of the line, from the information of the Turcomans, that "the country is broken by sand-hills and low rocky ridges, the last spurs of the Elburz, which extends in that direction across the desert as far nearly as Balkhán. The tract is said to be elevated above the desert north and south of it, and to have a few springs and pools of fresh water, and in spring abundant pasturage in some places frequented by the Yemuts." The entire distance from Kizil-Arvát to Krasnovodsk Fort is given by the Russians at 253 miles, but to Moola-Kári, the Russian post at the inner end of the Balkhán Bay, it is only 160 miles, which is easily traversed by the raiding Turcomans in three days. The southern line, conducting from Chikishlar by Chat and Khoja-Kileh, is somewhat shorter than the northern line, but is more difficult for the passage of troops. It seems to have been preferred by the Russians in all their recent operations, in consequence of the facilities it affords for obtaining supplies from within the Persian frontier to the south.

The Russian invasion of the Turcoman country which is now pending may be thus briefly described. During last spring, a strong force was landed at Krasnovodsk, a portion of which made a reconnaissance towards Kizil-Arvát, while a large detachment was sent south to Chikishlar. The northern column was subsequently marched southward, and the whole force concentrated at Chikishlar in July. The letters just read describe the march from Chikishlar to Khoja-Kileh in August and September; shortly afterwards, owing to failure of grain food, the Turcomans having cut off a caravan bringing up stores and provisions from Krasnovodsk, and the Persian supplies promised from Bujnoord not having arrived, Llomakin was obliged to retire, pursued and pressed by the enemy, from Khoja-Kileh to Chat, and subsequently to withdraw a great part of his force to Chikishlar, where it still remains. He held his ground, however, at Chat, where a permanent fortified post is now being established, and preparations on a large scale are also going on upon the sea-coast for resuming the invasion in the early spring. In the meantime the Turcomans have reoccupied Khoja-Kileh, and having taken heart from their success in the autumn, will probably offer a very determined resistance when the Russians again advance.

The country of the Tekeh Turcomans commences at Kizil-Arvát, and continues in a more or less connected line the whole way to Merv, the distance by the nearest line being about 400 miles; but it is hardly possible that any disciplined army could follow this direct desert route. The only convenient line for the march of a Russian force would be along the foot of the hills the whole way round to Serakhs, and then across the desert at its narrowest point by the high road from Persia to Bokhara, a detour which would increase the distance from 400 to about 450 miles.

The skirt of the hills along this line is called, as it is well known, the "Atock," and is divided into three districts: the Akhal Atock, the Deregez Atock, and the Kelat Atock; the Akhal Atock, which extends for about 160 miles from Kizil-Arvát to Deregez, is entirely inhabited by the Akhal division of the Tekel tribe of Turcomans; and I will now read you a brief description of the country, chiefly derived from Captain Napier's reports published in the *Society's Journal*, but supplemented from other sources.

The original settlement of the Akhal Tekel, on the borders of Persia, was contemporaneous with that of the Merv Tekel, of whom they are an integral portion. The whole tribe was brought from the "Labab," or banks of the Oxus, and have since maintained themselves successfully in spite of frequent attempts to subdue or to dislodge them, and in spite of the retirement of the main body to Merv. Their success has been due to their own warlike qualities, aided by the weakness of Persia, the feuds of rival border chiefs, and their disaffection and treachery.

The name "Akhal" applied to this tribe, is borrowed from one of their chief "obahs," or camps, near which are the ruins of a large Persian town and mounds of fire temples. It served in former days to distinguish them from the Tekel settled on the Tejen, and on the Kelat "Atock."

The country occupied by the "Akhal" consists of a strip of fertile land, varying from two or three to sixteen miles in width, and extending from Kizil-Arvát, about 160 miles (W.S.W. from Balkhán Bay) to Gawars, the most easterly settlement. It is plentifully watered at intervals by small streams flowing from the northern face of Elburz. Between the lines of the streams the desert stretches up to within a few miles of the base of the mountains.

The ruins of several towns, said to cover large areas, are to be found on the banks of the larger streams at Kariz, Akhal, Askabad, Annau, and Nissa. The ruins at the last point, which is about 50 miles north-east from Bujnoord, are said to be the most remarkable. The town is said to have been the centre of a district known as "Sham-i-Koochak," or "Little Syria," presumably from its beauty and fertility. Both the mountains and hill-skirts are devoid of trees, but afford fine pasturage.

The Turcoman "obahs" lie scattered along the base of the hills wherever there is sufficient water and pasturage, and have a more permanent character than the settlements of the other tribes, there being in fact little room between the mountains and the desert for migrations. Each "obah" consists of a number of tents pitched within reach of a stone enclosure that serves as a place of refuge from the sudden attacks of their Koord neighbours, to which the nomads are constantly liable.

The position of the Akhal "Atock" is exceedingly strong. To the north it is protected by an almost waterless desert, the shortest line across which is twelve days' march for a caravan, and is practicable only for small numbers. South of it extends a mass of lofty mountains, with few passes practicable even for mule carriage. West, 130 miles of barren desert intervene between it and the sea.

The fertile soil and good water supply of the "Atock" enable the Turcomans to raise all the grain necessary for their own consumption, and a considerable quantity of cotton, rice, and silk. They have no ready market for surplus produce, and require little beyond that which their own fields and looms supply them with. Having fine pastures and excellent blood, their attention is most devoted to horse-breeding, and in local estimation the produce of their studs is unequalled. Their horses are large and powerful, and usually of finer shape than those of the other tribes.

The number of tents or families of the Akhal are variously computed, some estimates giving as high as 20,000. A comparison of Persian and Turcoman estimates, the first being usually depreciatory, the latter always exaggerated, gives an average of about 8000 tents, or 40,000 souls, which is probably very near the truth. One-fifth of this number must be adult males.

The principal settlements of the "Akhal" are at Akhal, a permanent camp of 500 tents often increased to 1000 of various sections; Goombali, 1000 tents; Kariz, occupied only temporarily; Harrik-Kileh, Askabad, and Annau.

A very few additions to this description are all that is necessary. Firstly, I would remark that this Akhal country is the true Nisæan Plain of the ancients, where the famous Nisæan horses were produced. The city of Nissa, whose ruins Captain Napier had heard of, was the old Parthian capital, containing the royal sepulchres. Originally, no doubt, it was an Aryan settlement, as it is mentioned in the scheme of primitive colonisation recorded in the *Vendidad*;* but it attained its chief celebrity under the Parthians, and indeed has continued as late as the time of Abulghazi, that is, to within the last 250 years, to be the most considerable place on the frontier,† this pre-eminence being as much owing to the richness of the neighbouring pastures as to the importance of the position, at the point where the high road from Khárism after crossing the desert entered the Khorassán Hills.

There seem to have always been three great roads from the north joining Khárism with Khorassán and independently of the western caravan route by Dehistán. One of these entered the hills at *Duran*, and conducted through the *Abzar* Pass to *Bujnoord*; the second emerged from the desert at Nissa, and passed by the Garmáb Valley to *Kuchán*, while the third led from Abiverd by *Deregez* to Toos and Nishapoor. The second line, by Nissa, which was continued to Nishapoor, was the most frequented and was furnished with a line of caravanserais at the different halting-places in the desert. It occupied 12 stages, but except *Suburni* on the northern limit of the desert, 20 farsakhs from Khárism and *Shaharistán* of Nissa, on the southern border of the Steppe, the geographers supply no names.‡ Near to Nissa is the "Obah" of *Geuk Tepek*, or "the blue mound," which the Russians are said to have

* Having already fully explained the ancient history of Nissa in the Society's Proceedings, vol. xx. p. 179, I need not give any further references.

† The chief places noticed by Abulghazi along this frontier are *Duran* (always given as *Duruhan* in the French translation), *Nissa*, *Yawsurdi* (which I take to be *Gawars-urdu*, "camp of Gawars"), *Abiverd* and *Mikna*. *Faráveh* seems to have been no longer known. The *Gadar* of Isidore, a city of Parthylene and dependent on Nissa, may possibly be represented by *Gawars*.

‡ Yacút, the geographer, fleeing from Khárism on the approach of the Tartars in 1220 A.D., crossed the desert by this route, and does not seem to have suffered any particular hardship in the journey. For *Suburni*, see Ibn Athir, vol. xi. p. 247. Birúni gives the distance across the Steppe from *Kát* (near the present Russian fort of Petro-Alexandrovsk) to *Nissa* as ten caravan stages, and he names the central station in the desert *Miyán-jáh*, "the middle place."

selected as their permanent station for controlling the Akhal, and which requires therefore to be noticed in some detail.

"With the district of Kuchán, Geuk Tepeh," we are informed, "communicates by the Garmáb Valley, up which runs the best existing road. It is also about the nearest point of the Atock to Khiva. South-eastwards all the Akhal settlements lie open to it, and if it were occupied by Russia, the neighbouring tribes must either submit or move away to Merv. The three 'obahs' of Geuk Tepeh, Akhal, and Yengi Kileh which lie together, have a population estimated at 5000 families, the largest number by far to be found at any one time in one place in the Atock. There is ample pasture and corn land, watered by the Garmáb stream, which is called by the Turcomans the Schez-áb from its division in former times into eight irrigating branches, and is said to have a constant discharge of 10 feet section, with a rapid current. A large mound now known as the Karaoul Tepeh, marks the site of extensive ruins, and the plain for some distance is said to be covered with broken bricks and pottery."

The extreme eastern limit of the Akhal Tekehs is at the Obah of Gawars; beyond that point, after an interval without camps, commences the Deregez Atock, which is a district of great importance in itself, and of still greater importance in connection with the expected Russian advance on Merv. Deregez is a Persian district along the northern slopes of the great range, and shut out from the desert beyond by a chain of lower hills.* It is about 40 miles from west to east, by 30 miles from north to south, well watered, fertile, and populous, and mainly owes its celebrity to its being held by Toork and Kurdish tribes, who are exceptionally brave, hardy, and inured to war. It would be impossible for an army to pass from the Akhal Atock to Merv without traversing Deregez, for the desert comes up close to the foot of the northern hills. It is, moreover, the natural base for any serious operation against Merv, and it may therefore be regarded as certain that after the final subjugation of the Akhal Tekehs, should this ever take place, there will be a Russian occupation of Deregez, either with or without the consent of Persia, preparatory to a final movement on the Tekeh stronghold, between the arms of the Murgháb. Captain Napier, whose visit to Deregez is described in the Society's Journal, estimates the population at about 18,000, distributed between three large villages and some

* Deregez has no place either in ancient or modern geography, the district having been a dependency of *Abiverd*, which, as is well known, is mentioned both by Pliny and Isidore, and until quite recently has been an important place. It is probable that the *Epardus* of the Greeks which was lost in the sand, and which has accordingly been usually identified with the modern *Tejen*, may have derived its name from this same district of *Abiverd* (water of *Verd* or *Everd*), the two streams of the Tejen and Abiverd having been at one time absorbed in the same sandy swamp before reaching the Oehus. Persian tradition derives the name of *Abiverd* from a certain hero of romance, *Baverd*, son of *Gudaraz*, to whom the city was supposed to owe its foundation.

thirty hamlets, and he says that there is room in the valley for at least 5000 more. At present only sufficient grain is raised for the consumption of the inhabitants, but the communication is easy with *Kuchán* and *Shirwán*, which are among the best corn-producing districts of Khorassán, so that every facility would exist if a Russian force were encamped here for filling up supplies before crossing the desert.

The final operations against Merv will always be of considerable difficulty, whether the march be attempted directly across the desert from Deregez or Kelat, or whether a detour be made to the south, so as to reach Serakhs, and thus gain the high road leading to the Oxus. Captain Napier estimates the distance from the eastern extremity of the Deregez Atock (say from *Abiverd*, the ancient capital which gave its name to the district, but which is 30 miles beyond the inhabited part of the Deregez Plain) at 160 miles, and says that it is traversed by camels, or laden mules, in six days; the Tejen, which is the last remnant of the Heri-Rud, here shrunk to a rivulet, and absorbed shortly afterwards in the sands of the desert, being crossed in the second stage, and a few wells of brackish water being found at the other halting-places between the Tejen and the nearest arm of the Murgháb; but there is no instance that I am aware of, of an army having ever attempted the "trajet," certainly not in face of an enemy, and I doubt exceedingly if General Llomakin, unless under circumstances of the most pressing urgency, would undertake so perilous an enterprise.* It is far more likely that the Russians from Abiverd, which, though well watered, is now uninhabited, would traverse the Kelat Atock by Chardeh and Mehna to Serakhs, leaving the famous plateau of Kelat-i-Nadiri some 10 or 20 miles to the right. The distances along this line are approximately as follows:—From the last Akhal "obah" at Gawars, to Abiverd, through the Deregez Atock, 70 miles; to Mehna, along the Kelat Atock, 60 miles, and on to Serakhs, 70 miles, giving the whole distance from Kizil-Arvát to Serakhs at 360 miles.

The Deregez and Kelat Atocks have not, perhaps, as fine pasturage as the Akhal Atock, but they have much greater advantages in regard to soil and water, the rivers being more numerous and of larger volume, while the plain when cleared of sand is found to be covered everywhere with an alluvial deposit. In ancient times *Nissa* and *Abiverd* were sister capitals, and *Mehna*, south of Abiverd, was also a place of some consequence, being the chief city of the district of *Khawerán*, which was one of the most fertile portions of Khorassán.

Kelat-i-Nadiri, from which the Kelat Atock takes its name, is a natural fortress of extraordinary size and strength. A plateau 18 miles

* The high road described by Isidore seems to have led direct from Abiverd to Merv, as the distance is only 58 scheni, or about 170 miles, from the frontier of the Nissa district, through Abiverd to Margiana, but the Ochus may at that time have contained water which would have greatly facilitated the transit.

in length, and containing an area of about 150 square miles, is surrounded by a ridge of precipitous rocks, from 50 to 60 miles in circumference, and rising to a height of 1500 feet above the general level of the country. Captain Napier, who thoroughly examined the fort and described it in full detail (see Royal Geographical Society's Journal, vol. xlv. p. 75), says that "it can only owe its origin to some violent convulsion of nature, acting upon a limited area with sufficient force to elevate and distort the whole surface. Even so the wonderful completeness and uniformity of the chance disposition of the mountainous masses forming the barrier, is beyond all conception, a phenomenon probably without parallel, and of which the most accurate drawings could alone convey any distinct impression."

From the Kelat Hills there is also a short cut across the desert to Merv, distant about 120 miles, but we are told that it is quite impracticable to the march of an army, though the Tejen stream supplies water at the end of the first caravan stage.*

I must repeat, then, that if Merv is ever attacked by a Russian column from the Caspian, the troops will, in my opinion, have to operate along the high road leading north-eastward from Serakhs.† The road from Serakhs to Merv measures something over 100 miles, and the distance is usually performed in six marches. The desert is here "a level, hard, flat surface," according to Burnes, quite different from the sandy plain between the Murgháb and the Oxus, and Bloqueville, who accompanied the Persian expedition against Merv in 1860, mentions that water can be laid on this road for a considerable distance by damming up the Tejen stream and digging a small canal along the line of route. There are also wells of brackish water, and cisterns, more or less ruined, at all the halting-places. In fact, although this interval between Serakhs and the Murgháb River is part of the great Turcoman Steppe, and is no doubt badly supplied with water, it has never proved any real impediment to the march of an army. In 1860 a large Persian force, well supplied with artillery, and carrying provisions for three months, with an immense quantity of baggage, crossed the desert without difficulty in the middle of summer, and it

* Ibn Dusteh, who wrote early in the tenth century, says that the Herat River, after irrigating the land at Serakhs, took the name of *Kloushk-Rúd*, or "dry river," and was lost in the sand at a place called *Al-Ajume'h*, or "the marshes," between Serakhs and Abiverd. In the time of Yaeüt (A.D. 1225), the stream hardly reached as far as Serakhs, the inhabitants of that town being dependent on wells for their drinking water in summer.

† Although the name of *Serakhs* is not found under that or any similar form in ancient geography (the *Siroc* of Isidore, near Nissa, being certainly a different place), yet it is no doubt an ancient city, being ascribed in Persian tradition to the same age as Nissa and Abiverd. Its present name was probably given to it by the Turanian tribe, which occupied it during the Sassanian period, and whose ruler, according to Birûni, had the family title of *Zahigeh*, a name which calls to mind the *Zabos* of the Kadphises coins, the distinctive title of the *Körozul* or Kujur tribe.

is pretty certain, therefore, that at a more favourable season of the year a Russian column skilfully led would be equally successful. To try to force the passage of the Murgháb, however, after crossing the desert, against 40,000 Tekehs entrenched behind formidable earthworks, and defended on each flank by extensive inundations, would be a more difficult operation, the probable result of which I need not at present discuss. It will be sufficient to recapitulate the leading features of the geographical argument I have here submitted. The distance from the Caspian to Merv by the Akhal country and Serakhs is about 700 miles, and to keep up communications by a line of posts along this interval would be a very serious operation indeed. From the western end of the Deregez Atock, moreover, to Serakhs, a distance of 200 miles, the line would pass through Persian, or quasi-Persian territory, and Russia therefore could not of course undertake such a movement without an understanding with the Government of the Shah. In the matter of supplies, also, food could not be possibly obtained in the districts traversed by the Russian columns. Either provision caravans must follow the troops from the Caspian, which along a line of 700 miles would entail enormous expense and risk, or grain must be supplied from Khorassán. The surplus grain available from Bujnoord and Kuchán has been estimated at 700 tons, equal to about 5000 camel loads, and if this were placed at the disposal of the Russian commissariat the passage of the troops would be most essentially facilitated. Altogether, having considered the question from these several points of view, I have come to the conclusion that with the cordial co-operation of Persia the occupation of Merv by Russian troops from the Caspian, starting from Chikishlar and Krasnovodsk, and supported by an auxiliary column from the Oxus, would be comparatively easy; that if Persia were merely neutral, not supplying food or carriage, but, on the other hand, not raising territorial difficulties, the operation would be difficult, but might possibly succeed; but that if Persia were decidedly opposed to the Russian movement, and refused to permit any infringement of her territorial rights, the march from Akhal to Merv would be impossible.*

* I do not propose to give any account at present of the ancient or modern history of Merv. It is probably one of the oldest capitals of Central Asia, and would require a special monograph for its adequate illustration. It is not, however, by any means the unknown place that it is generally supposed to be, a number of travellers having passed through Merv, in the course of the last fifty years, on their passage either from Herat to Khiva, or from Meshed to Bokhara, and having, most of them, published their observations on the town and district. Among these travellers I may cite Burnes, Abbott, Shakespeare, Taylour Thomson, Dr. Wolff, and Monsieur Blocqueville, the last-mentioned being a French gentleman, who accompanied the Persian army in the expedition against Merv of 1860, and, being taken prisoner by the Tekehs, was kept in captivity for fourteen months. He published an account of his adventures amongst the Turcomans in the 'Tour du Monde,' 1866.

The following discussion took place on the reading of the Paper :—

Captain W. GILL, R.E., said it was now nearly six years ago since he was in the neighbourhood of the Atreck. It was a remarkable fact that the shore of the Caspian had changed in the way which Sir Henry described. When he (Captain Gill) was off Chikishlar, the boat from which he approached the land could not reach the shore within two or three miles, as there was a long, shelving bank. The change in the nature of the shores of the Caspian might possibly have been caused by the diversion of the Oxus, that river containing an enormous body of water. But this was only a theory. There could be no doubt, however, that at the present time it was difficult to land anywhere on the south-eastern corner of the Caspian. The Russians had now only the physical difficulties to contend with, for no vessels besides their own were allowed on the sea. The Island of Ashurada, and the bay to the west and south, were very well sheltered, and would accommodate a considerable number of ships, the water being of good depth. The island formed certainly an admirable position, except for its exceeding insalubrity, the fevers there being of a severe type. It formed an excellent spot from which to send supplies to the interior. There were three roads towards Merv from the west, or, at all events, three ways of reaching that place. The first was the road to the north, from Kizil-Arvat along the northern slope of the Atoek. The second followed the River Atreck, and a third ran along to the south, passing by Shahrud and Meshed. The lower course of the Atreck has been well described in the Russian letters, which had filled up the gap in our knowledge of the details of this river, although it had been well known that there was an easy road the whole way up the Atreck. The road on the north was an excellent one, being well watered and furnished with supplies. Kariz was pointed out to him as being specially well supplied with water. The different ranges of mountains had all more or less the same characteristics. They were high, with roads and passes through them, but probably not one-tenth of the passes were known to geographers. They afforded excellent positions for small bodies of cavalry, and a long baggage train moving up along the northern slopes of the Atoek would be liable to attacks from small bodies descending from the mountains through passes known only to themselves. There were several points of great strategical importance, Bujnoord being one, if the road of the Atreck was considered. There were two roads from it to the Atreck, one by a narrow defile to the east, following the river Babaman, the tributary of the Atreck on which Bujnoord is situated, the other a difficult road over the Kuh-Akhir Range. These two passes could easily be held by a force in possession of Bujnoord, and would render that place an excellent point for attacks upon any column attempting to move up the Atreck Valley. Kelat, as Sir Henry Rawlinson had pointed out, was a very extraordinary place. It was a plateau enclosed by mountains, was well watered, and grew corn enough to support all its inhabitants. When he was there the people looked unhealthy and sick; but as a fortress it was one of the most remarkable places in the world. There were only two or three very narrow passes through the mountains by which it was surrounded, and it was not commanded by anything within range of artillery. The Tekoh tribe were certainly a very important people, inhabiting as they did the whole of the country to the north of the Atoek, and possessing a very fine breed of horses. If properly officered, they would probably form a magnificent body of cavalry. Their horses were perhaps unequalled by any others in the world; they were not small, like Arabs, for he had seen some 16 hands high; they resembled English horses, but with a little more bone, and the distances they covered in a day were quite astounding. The people themselves were always ready to fight with anybody, and were only too anxious to be taken under the protection of the English. They would

make excellent irregular cavalry. The district of Deregez, when he was there, was governed by a Kurd, and a very fine specimen of a man. His district was surrounded on three sides by the Turcomans, but he had managed to keep it in good order, and by care and pluck kept the Turcomans out of it. It was one of the richest and most flourishing districts in the whole of Persia. The Russians represented their frontier as coming down to the Atreck, but that would give them the northern mountains with the passes through them, and would render their advance by the Atreck perfectly secure even from the Persians or any power in alliance with them. Knowing the importance of this, they had produced maps in which the features of the country were quite distorted, and in which the Atreck looked a natural and innocent frontier. The Atreck frontier would include Deregez, which was entirely Persian, as well as a great many other Persian villages. The great moral to be drawn from the consideration of the physical and political features of this region was that which Sir Henry Rawlinson had so clearly brought out,—that if Persia were friendly, the Russians would have no difficulty whatever in advancing by any of the roads which they chose; if Persia were indifferent, they might have difficulties; but if Persia were inimical, they would find it quite impossible to advance, on account of the mountainous nature of the country, which afforded excellent means of attack, and enabled very small bodies to harass the long convoys that would be requisite. A great deal of the country near the Atreck was very fertile, and produced large crops of grain. Deregez especially was very rich.

Mr. R. MICHELL did not think the level of the Caspian could ever have been affected by any addition from the Oxus. He rather thought that the changes were due to slow upheaval of the land, and that the same cause had altered the courses of the rivers. All the mountain systems in Asia extended east and west, bearing out his theory that there was in course of formation a backbone to the Turcoman region. Such an upheaval would have the effect of dividing the waters, and causing the Oxus in the course of time to turn to the north, while the Tejen and the Murgháb turned to the south. Many facts strengthened that view. For instance, in the ruins at Mestorian, lately visited by the Russians, there were water conduits or aqueducts along the tops of the walls, showing that at one time the water flowed above the level of the soil upon which the city stood. It was difficult to imagine that any works which the Russians might undertake would ever restore the country to its former state of fertility. Nor is it likely that they will ever undertake any such a task, for in their own country, before they had a proper macadamised highway, the Russians rushed into railways; and if they neglected roads in their own country they would not be likely to construct them in the deserts of Asia. Sir Henry Rawlinson had not touched at any great length on the subject of Merv, and yet it was owing exclusively to him that our attention and interest had been attracted to that place. He thought the English knew more about Merv than the Russians did. No Russian had ever been there except the Sergeant Effrencof in 1789, and a captive of that nation who had been languishing there for years, but who had not been heard of recently. This man seems to have addressed letters to the English Government in preference to his own. He thought the interest in Merv was temporary and transitory, for when the Russians once occupied it they would probably go forward in a more southerly direction. He was of opinion that it was a pity we should debar ourselves the right of free discussion of the geography and ethnography of the interesting country of the Turcomans, which could hardly be considered as part of Turan proper, being perfectly independent of *Uzbeistan*, simply because the Russian explorations were in the form of military and political encroachment.

The CHAIRMAN (Sir Rutherford Alcock) said, in modern times no country had profited so much by geography as Russia, and no country had been better served

by its scientific staff of explorers. The courage, endurance, and determination that they had shown in penetrating the wilds and deserts of Central Asia and Mongolia deserved all praise, and those who were least disposed to admire the motive with which Russia was carrying forward those explorations, could not deny her officers their meed of admiration for the energy and skill which they had shown. There was one conclusion to be safely drawn from the geographical features brought before the Meeting, namely, that whatever might be the intentions of Russia in reference to Merv, she must have Persia's consent before she could occupy that town from her present line of advance. That was a matter of political geography, and therefore, though the Society did not deal with politics, they were quite at liberty to take note of so important a fact. Mr. Michell had gone far to confirm what was reported to have been said quite recently by a Russian ambassador, "that the Russians never thought of Merv till the English began to talk about it." But we are not bound to place implicit trust on the accuracy of an assertion, so little in accord with what is known from other and less questionable sources.

The Basin of the Helmund. By C. R. MARKHAM, C.B., Secretary R.G.S.

(Read at the Evening Meeting, February 24th, 1879.)

Map, p. 224.

THE western portion of Afghanistan includes the inland basin of the River Helmund, and the smaller inland basin of the Abistada Lake. It is comprised in one of those river systems without any outlet to the sea, which occupy a vast area in the interior of Asia, where the drainage flowing from a circle or semicircle of mountains is formed into a lake or morass at the lowest level it can reach. Such are the basins of the Caspian and the Aral, of the Balkhash and Baikal, of Lake Lob and the Tibetan plateau, of the Heri-Rud and the Murgháb, of the Helmund and the Abistada Lake.

The two latter form the subject of the present paper. They are surrounded, except to the westward where the Helmund drainage is emptied into the Sistan morass, by a vast amphitheatre of lofty mountains. To the eastward is the great chain of the Western Sulimanis, forming the water-parting between Afghanistan and India. To the north is the ridge connecting the Hindu Kush with the Sulimani, and the continuations of the Hindu Kush mountains, known as the Koh-i-Baba and the Siah-Koh. To the south are the Khoja-Amran Range and the desert of Baluchistan, and to the west is the depression of the Persian desert and the Lake of Sistan, which receives the surplus waters of the Helmund Basin. These limits enclose a mountainous region which is 420 miles in length by about 250 in its greatest breadth.

The basin of the Helmund is classic ground, and is the scene of many of the ancient Persian tales as related in the pages of Ferdosi. The tyrant Zohak, who overthrew the Persian monarchy then represented by Jamshid, was in turn overthrown and driven out of Iran. His memory is preserved in the castle of Zohak near Bamian, and his

descendants are said to have founded the dynasty of Ghor, in the wild recesses of the Siah-Koh. Zal was a prince who dwelt on the banks of the Helmund, and the story of his love for Rudabah, a princess of Kabul, is one of the most romantic episodes in the "Shah-namah." They were the parents of Rustam, the great hero of ancient Persian history; whose castle is said to have been on an island in the lake of Sistan.

The mountain masses continuing westward from the Hindu Kush are furrowed by the river valleys. They thus form a series of ridges running west and south-west from the western extreme of the Hindu Kush, where that name ceases to be used.

The main continuation of the Hindu Kush is called the Koh-i-Baba, and runs due west, separating the drainage of the Oxus from that of the Helmund. It is only known at its eastern end, where there is a magnificent view of three snow-clad mountains, and of a succession of lofty peaks as far as the eye can reach. Here the peak known as the "Koh-i-Baba," is 18,000 feet above the sea. This scenery has been enjoyed by travellers who have taken the route to Bamian. Dr. Griffith ascended the Koh-i-Baba range in August 1840, to 13,500 feet, and he estimated the height of the peaks at 15,000 feet, the upper portions being entirely bare, and consisting of angular masses of rock. The general character of the range is great barrenness. Ferrier mentions a lofty snow-capped cone called the Chalap Peak, which is probably about 18,000 feet high, as towering above all the others. The eastern end of the Koh-i-Baba Range is crossed by three passes leading to Bamian from the upper valley of the Helmund, namely, the Irak, the Hajikhak, and the Pusht-Hajikhak. The road from the Helmund Valley winds up a zigzag defile to the summit of the Hajikhak Pass, an ascent of 3000 feet, which is dangerous and difficult in winter on account of snow-drifts. The height of the crest is variously given by Burnes, Wood, and Griffith, but the mean of their observations is about 12,000 feet. The descent into the Kalu district and thence to Bamian is between a ridge of high hills on the right, and a rough irregular valley on the left. The Pusht-Hajikhak, to the south, offers a better road, but can only be traversed by caravans from July to September. The Irak Pass is approached, from the Bamian side, by a good road with a gentle ascent, and the summit is a bleak table-land where the snow covers the ground, and high winds are almost continuous. The summit is about 13,000 feet above the sea. The descent is equally gradual and easy. A valuable description of the route from Kabul to Bamian over the Irak Pass, by General Kaye, who traversed it during the first Afghan war, will appear in the next number of our 'Proceedings.' Westward of these passes to Bamian, the Koh-i-Baba Range is entirely unknown. The Koh-i-Baba extends, from the point where the Hindu Kush ends, westward for about a hundred miles, when it separates into two ranges, one continuing westward and called

the Safid-Koh, or white mountains (not to be confused with Safid-Koh which bounds the Kabul Valley to the south), and the other running south-west and separating the basin of the Helmund from that of the Heri-Rud River. The latter is called the Siah-Koh, or black range.

The Siah-Koh runs south-west towards the Persian desert, dividing the Helmund drainage, and the rivers flowing direct to the Lake of Sistan, from the valley of Herat. Ferrier is the only European who claims to have crossed the Siah-Koh Range to the east of the high road from Kandahar to Herat. On that road, south of Herat, the elevation of the water-parting is 6500 feet. The country of Ghor is on the southern slopes of the Siah-Koh.

The Koh-i-Baba and the Siah-Koh, being practically the continuation of the Hindu Kush, form the northern boundary of the basin of the Helmund. They are the Paropamisus Mountains of ancient geographers.

At the point where the Hindu Kush and Koh-i-Baba join, a ridge runs off to the south and west, separating the valley of the Helmund from that of the Argandab. This is the chain of the Paghman Mountains. At first it divides the Ghorband and Kabul valleys from that of the Helmund. Here it is crossed by the road from Kabul to Bamian over the Unai Pass, which is easy and not very steep. The road then descends into the Helmund Valley, and crosses the Koh-i-Baba by the Hajikhak Pass to Bamian.

From the Paghman Range a ridge passes eastward, and connects the system of the Hindu Kush with that of the Sulimanis. This ridge, passing north of Ghazni, separates the basins of the Kabul and Helmund, and is crossed by the road from Kandahar to Kabul. It is called the Sher-Dahan, from the pass which is the highest point on the Kandahar and Kabul road. From the north this pass is approached by an easy ascent to the crest, and the southern descent towards Ghazni is through a narrow gorge to an extensive plain. In the winter the Sher-Dahan Pass is entirely blocked up with snow, and can only be passed with great difficulty on foot; but it can be turned by the Sargawan Kotal, which is always practicable for horsemen.

The Gul-Koh Mountains start from the Sher-Dahan ridge, or, more strictly, from the Paghmans, and separate the Argandab Valley from the Ghazni Basin, and then from the Turnuk. They attain a height of 13,000 feet, the lower parts being scantily clothed with trees, and the summits showing nothing but barren rocks. In the spring and summer a vast variety of wild flowers clothes the slopes; hence the name. There are six passes near Ghazni which lead over the Gul-Koh Mountains into the valley of the Argandab—namely, the Kakrak, Turgan, Gulbarri, Roba, Barakat, and Markul passes.

From the Gul-Koh Mountains a spur branches off to the south, which bounds the Turnuk Valley to the south and east, dividing it from the

basin of the Abistada Lake, and, lower down, from the Arghesan Valley. It is called the Surkh-Koh.

Between the Gul-Koh and Surkh-Koh hills on the east, and the Sulimani Mountains on the west, is the lofty inland basin of Lake Abistada. It is 120 miles long and about 60 wide, with the above limits to east and west, mountains separating it from the Arghesan Basin on the south, and the Safid-Koh and its spurs to the north. The Takri and Katasang hills intersect the northern half of the Abistada Basin.

These mountain ranges form so many rays branching west and south-west from the Hindu Kush. First the Koh-i-Baba and Siah-Koh mountains form the northern limit of the Helmund Basin. Next, the Paghman Hills separate the Helmund from the Argandab, the Gul-Koh Hills separate the Argandab from the Turnuk, and the Surkh-Koh and Gul-Koh divide the Turnuk and Argandab valleys from the Abistada Lake system. The Sher-Dahan Range is the water-parting between the Helmund and the Kabul, and the Western Sulimanis between the Helmund and Abistada and the Indus. Lastly, the Toba and Khoja-Amran mountains, to the south, complete the chain encircling the Helmund Basin. Having thus examined the orography of this region, we may now proceed to consider the river valleys which these ranges enclose.

Three rivers flow direct into the Lake of Sistan from the Siah-Koh Mountains, without first joining the Helmund. The westernmost of these is almost on the boundary between Afghanistan and Persia. This is the Harut-rud, or Sabzawar River, rising in the continuation of the Siah-Koh, to the south of Herat, and flowing southwards for 50 miles under the name of Adraskend. Here it receives the Rudi-i-Gaz, and flows through the plain of Sabzawar under the name of Jaya. Finally it is known as the Harut-rud until it falls into the Sistan Lake, after a course of 230 miles. Much of this course is through a sandy and barren region.

The Farah-rud is so called from the town of Farah near its banks, on the road from Kandahar to Herat. It rises in the unexplored region of the Taimuni Imaks, the ancient kingdom of Ghor. This mountainous and secluded tract, in the recesses of the Siah-Koh Mountains, formed an independent sovereignty in the twelfth century, and its kings are said to be descended from Zohak, the famous tyrant of ancient Persia. The Ghorî dynasty flourished from A.D. 1150 to 1214; and in 1180 Muhammad Ghorî replaced the Ghaznîvide dynasty in India, taking Delhi and Ajmir in 1193. The Ghorî supremacy came to an end on his death, and Ghor was overrun in the following century by the Mughal conquerors. The inhabitants are men of Turanian origin, but speak a dialect of the Persian language. A section is said by Abul Fazl to be descended from a colony established by the Mughal conquerors, consisting of four regiments of a thousand men. Hence the name *Hazâra* (a thousand) for the people, and *Hazâra-jat* for the country. But the question of the origin of these mountaineers is one of great intricacy,

and even Sir Henry Rawlinson hesitates to pronounce a decided opinion on the subject. The whole of the region on the southern slopes of the Siah-Koh, and in the upper valleys of the Farah-rud, Khash-rud, Helmund, and Argandab is inhabited by the Imaks and Hazáras. The Imaks are to the west of the Hazáras, and inhabit the Ghori country, numbering some 450,000 souls. They are chiefly occupied as shepherds, living in tents, their chiefs occupying strong castles. The Imaks are divided into Taimunis, Taimuris, and Zuris.

The Farah-rud River drains part of the Ghori country, and flowing south-west for about 200 miles, falls into the Lake of Sistan. It is crossed by the main road from Kandahar to Herat, and Conolly says that it is nearly dry during part of the year. But in the spring it is a wide and deep river, and during floods caravans are sometimes detained for weeks. A great deal of the water is taken off for irrigation.

The Khash-rud, east of the Farah-rud, also rises in the Siah-Koh. Conolly describes it as having a broad bed with not much water. In the low country, as they approach the lake, these rivers have their banks fringed with tamarisk-bushes, mimosa, and dwarf palm.

The River Helmund rises at Fazindaz in the Paghman Mountains, 11,500 feet above the sea, and after a south-westerly course of 700 miles, falls into the Sistan Lake. Near its source it is crossed, at Gardan-Diwar, by the Kabul and Bamian road, between the Unai and Hajikhak Passes, and here the elevation is 10,076 feet. At this point the Helmund Valley has been visited by Masson, Burnes, Wood, Griffith, and by English officers during the first Afghan war. The river flows along the northern skirt of the plateau of Urt, a plain on the crest of the Paghman Range 8 miles wide, and 9000 feet above the sea. Here it is joined by the Ab-i-Siah stream coming from the southern slope of the Hajikhak Pass. Thence it passes on, down a deep valley for 35 miles, hugging the southern skirts of the Koh-i-Baba, to Ghaoch-Khol, a village at the junction of the Ab-i-Dilawar. The banks are fringed with rose-bushes and osiers. It next receives rivers on the left bank from the Paghman Hills, called the Tirin and Gurumah, which flow through districts called Tirin, and Nesh; surveyed by Captain Sanders in 1840. After leaving the mountains through which it flows for several hundred miles, the Helmund takes a course along the eastern border of a pastoral district called Zamindawar, which extends for 40 miles to the west of the river. Most of the wool exported from Afghanistan comes from Zamindawar; which district is inhabited by the Alizai branch of the Durani clan of Afghans. An important river called the Bugran, rising in the Siah-Koh, and flowing for some distance parallel with the Khash-rud, waters Zamindawar from north to south, and falls into the Helmund. Lieutenant Cooper, in 1840, mapped about 80 miles of the course of the Bugran, from the Helmund to a place called Hazar-Darakht, far up in the mountains.

Girishk is at the southern limit of Zamindawar, on the right bank of the Helmund. The fort of Girishk stands about a mile and a half from the river, and the site was selected from its proximity to the fords practicable in June and July, and to the ferry which is established when the river is not fordable. The river, in its course through the mountain valley, is believed to flow in a deep channel between scarped rocks, and to be much obstructed by enormous boulders. At about 40 miles above Girishk, where it has Zamindawar on its right bank, it has a sandy and gravelly bed and runs through a flat country with a less confined channel. Here the water begins to be drawn off for purposes of irrigation. At Girishk, Conolly describes the Helmund as having banks a thousand yards apart, the right low and sandy, but the left rocky and high. In October it had a stream stirrup deep at the ford, with a width of 350 yards. About 50 miles of the course of the Helmund, above Girishk, was surveyed in 1840, and the map, preserved by the late Captain William Fraser Tytler, is now in the Geographical Department of the India Office.

At about 45 miles below Girishk, the Helmund is joined on the left bank, by its principal tributary the Argandab. It then takes a great southern sweep through the Garmsil region, and falls into the Sistan Lake, after a course of over 700 miles. The Garmsil consists of a breadth of rich land about two miles wide, extending along the banks of the river. Even in the dry season the Helmund is never without a plentiful supply of water, but in the winter, after the floods, it comes down with astonishing violence and rapidity. It is prevented from overflowing by embankments of ancient construction at several points, which have now fallen into decay, and in its lower course much of the water is taken off to irrigate the fertile tracts on either bank.

The Argandab, the chief tributary of the Helmund, has its sources 8500 feet above the sea, in the roots of the Paghman and Gul-Koh mountains, in the two elevated valleys of Jarmatu and Aludani, which are inhabited by independent Jaguri Hazáras. The district at the sources of the Argandab is called Malistan on Fraser Tytler's map. The river flows thence down a valley between the Paghman and Gul-Koh ranges, receives the Turnuk 30 miles below Kandahar, and falls into the Helmund after a course of 350 miles. The point of junction is about 2000 feet above the sea, so that the fall is 18 feet per mile, and the velocity of the current in winter is very great. Little is known of the Argandab Valley. In September 1841, it was visited by General Lynch, who crossed the Gul-Koh Range, and came upon the river about midway between its source and Kandahar. Here the Argandab is a fine river, flowing rapidly over a ford where the water was up to the horses' girths. The valley is populous and well cultivated, and there were numerous forts.

Kandahar is situated on a level plain between the Argandab and

Turnuk rivers, 233 miles south-west of Ghazni, 318 from Kabul, and 380 from Herat; and here the Argandab is easily fordable in July, the stream being 40 yards wide. Fraser Tytler preserved several manuscript route-maps of portions of the basin of the Argandab, which are now in the Geographical Department of the India Office. These are a route from Kandahar across the Argandab, and north as far as a place called Gunda; a survey of the district of Nesh between the Argandab and the Helmund; the country on the right bank of the Argandab to the east of Nesh; the district of Kakrez between the Helmund and the Argandab, with much detail, especially on the right bank of the latter river; and a detailed survey of the Valley of Kandahar by Fraser Tytler himself, down to the junction of the Argandab and Turnuk. Below the Jaguri Hazáras, the Argandab Valley is occupied by the Ghilzi Afghans, and below them are the Alizais, a sept of the Durani clan.

The Turnuk River is better known than any other in Afghanistan, because the road from Kandahar to Ghazni passes up its valley. This road was traversed by the armies of Lord Keene and General Nott, and has been travelled over by many Europeans. The sources of the Turnuk are 7040 feet above the sea, at the base of a rock on the high road, and to the north of the village of Mudur, where there is a pool of water supplied by six or seven springs. Thence the river flows through an open ravine to Kalat-i-Ghilzi, where the valley becomes more contracted. Kalat-i-Ghilzi is a strong fort on the right bank, 89 miles from Kandahar, and 144 from Ghazni, situated on an isolated plateau, having a command to the south of several hundred feet above the surrounding country. It is 5773 feet above the sea. The Turnuk in its lower course supplies irrigation to a rich and populous valley, and passes 8 miles south of Kandahar to join the Argandab about 40 miles lower down; but most of the water is consumed in irrigation. The whole length of the course of the Turnuk is 200 miles, and the fall 18 feet per mile. General Lynch explored several of the valleys down which the streams flow from the Gul-Koh Mountains to swell the Turnuk. One of these, called Resenna, he describes as a basin about $7\frac{1}{2}$ miles long by 5, and surrounded by high mountains. This valley was highly cultivated, yielding fine crops of corn and lucerne, and was irrigated by *khariz*, or underground watercourses. It was densely populated by people of the Hazára race, and covered with forts, in which they reside for safety. He visited a similar valley, within the Turnuk Basin, called Angori, and he describes the valleys of Resenna and Angori as perfect little paradises, surrounded by barriers of rocky mountains, from which numerous streams descend. In the Angori Valley there were no less than 150 forts, in which all the inhabitants lived, and into which they drove their cattle in times of danger. In these valleys there is a plentiful growth of the *Salab* (*Salap-i-Misri*), a plant like an onion. The bulbous root, when dried in the sun, shrinks into a small hard substance, which

is the *Salep* so much used in India for its nutritive qualities. The Afghan name is *Peej-i-Koh*, or "the onion of the mountains"; but it is a *Euloplia* (*Orchidaceæ*), not an onion.

The Arghesan and Dori, which unite and join the Turnuk, drain the eastern slopes of the Western Sulimani Range, and the northern sides of the Khoja-Amran. The Arghesan, rising on the Gharaibi Pass, in the Sulimanis, and flowing west, joins the Dori 7 miles from Kandahar. The course of this river is entirely unknown; though the Bombay column, under Neil Campbell, must have crossed it near its source. The road from Kandahar to the Gomul Pass, which has never been traversed by any European, is said to meet the Arghesan 35 miles from Kandahar, and to follow its course for 20 miles to the foot of the Sargaz Kotal which divides two branches. After crossing this pass the road again reaches the bed of the Arghesan and continues along it for 30 miles to the Ghwarza Pass, where it leaves the river. The Dori River rises in the west slopes of the Kohjak Pass—on the road from Kwatah (Quettah) to Kandahar—and after a course of about 90 miles, falls into the Turnuk.

Thus the rivers which drain direct into the Sistan Lake are the Harut-rud, the Farah-rud, the Khash-rud, and the Helmund: of which the latter is by far the most important. The Helmund, Argandab, and Turnuk flow down valleys in the mountains of the Siah-Koh and its offshoots, of the Paghman and Gul-Koh, all belonging to the Hindu Kush system; while the Arghesan and Dori drain the eastern slopes of the Sulimanis and their offshoots. The history of the lower course of the Helmund, after the river has received all its tributaries, and of the changes which have taken place in its mouths, presents a most interesting and instructive subject of investigation for the student of comparative geography. But the whole history of Lake Sistan and its changes has already been exhaustively discussed by Sir Henry Rawlinson in a learned paper which appeared in the forty-third volume of our 'Transactions.' *

It remains to notice the remarkable isolated basin of Lake Abistada on the eastern side of the Western Sulimani Range.† This basin is 150 miles long by 50 broad. Its eastern half is drained by the river of Ghazni. This river is formed in a little valley 12 miles from Ghazni, at the foot of the Gul-Koh mountains. The city of Ghazni, on the left bank of the river, is built on level ground between it and a spur of the Gul-Koh range. This place, which is 7726 feet above the sea, is important because it is the capital of the Ghilzi country, and is on the direct line of communication between Kabul and Kandahar, 85 miles from the former, and 233 from the latter. Here, too, was the capital of Mahmud, the famous invader of India, who flourished from A.D. 997 to 1030. It was Mahmud who formed the river of Ghazni. He dammed

* 'R. G. S. Journal,' xliii. p. 272 (1873).

† See map in January number of the 'Proceedings,' p. 80.

up two out of the three rivulets which are its sources, and thus formed the present river. In the dry season it issues from the dam a stream 20 feet wide and 2 deep, with a velocity of 5 feet per second. In spring it is much larger. The dam, called "Band-i-Sultan" consists of a wall of masonry closing up a rocky valley, and when complete it was 300 yards long, and from 20 to 30 feet high. The outlet is closed in autumn, and a lake fills the valley, 600 yards across. In spring, the orifice is opened for irrigation, and after a course of 10 miles the volume is much reduced, water having been taken off to irrigate fields on either side. Thence it flows over a desolate tract, impregnated with salt, to the Abistada Lake. The eastern half of the Abistada Basin is occupied by the districts of Zurmat and Katawaz.

Zurmat is a valley 40 miles long by 20. Near its northern extremity is a town called Gardez, containing 250 houses of Tajiks, and still further north is Michelga. The mountains which bound Zurmat on either side furnish many *khariz* or underground watercourses for irrigation, and a line of forts is built along these *khariz*, and parallel to the bases of the hills. From Gardez a good road crosses into the Logar valley and goes thence to Kabul; and there is a more difficult one, by Michelga, to Jalalabad. The Shutar-gardan Pass, from the Kurram Valley, also opens upon Zurmat, and the road leads across that district where water, forage and grain are abundant, to Ghazni. The River Jalgu waters the Valley of Zurmat, and falls into the Ghazni.

Katawaz, also in the Abistada Basin, to the south of Zurmat, is 48 miles long by 24 in breadth. This district consists of a level and open plain, bounded on the east by the Western Sulimani Mountains, on the west by the lower hills of Katasang, which bound the valley of the Ghazni on the east, and on the south by the Abistada Lake. Katawaz is entirely occupied by the Suliman-Khel division of the Ghilzi tribe. It is watered by the River Paltu which rises in the Western Sulimanis, and has an independent course to the lake. Its stream is about 20 feet wide and a foot deep. The Pass of Paltu, at the source of the river, is reported by Broadfoot to be difficult, and leads over the Sulimanis into the country of the Karotis in the Gomul Valley.

Lake Abistada is 7050 feet above the sea. It was described by the Emperor Baber, and has been visited during this century by Masson and Broadfoot. It is 65 miles south-west of Ghazni, a distance which nearly represents the length of the river, and it receives the Ghazni River, with its affluent the Jalgu, at its northern end; and the Paltu River from the east. The lake is 17 miles long by 15 broad, and it has a trifling depth of 12 feet in the centre. It is bounded by a gently shelving margin of naked clay. Not a tree is in sight, nor even a blade of grass. The water is salt and bitter, and the banks are deeply encrusted with salt. The fish brought down by the Ghazni River, on entering the salt part, sicken and die, and at the point where the river

enters the lake, thousands of dead fish are strewn. Some of the sources of the Arghesan River approach very closely to the southern margin of Lake Abistada, but they are separated by a ridge, from the northern slope of which a stream, with a very short course, flows into the lake. The Afghans say that this stream drains the waters of the lake; and the point is still doubtful. The surrounding country is very barren and dreary, with scarcely any inhabitants.

The basins of the Helmund and Abistada are partly occupied by Imaks and Hazáras, and partly by Afghans, while in the cultivated parts there are many descendants from Persian settlers. The Imaks, a people of Turanian descent, but speaking Persian, occupy the ancient kingdom of Ghor, on the southern slopes of the Siah-Koh Mountains. To the eastward are the Hazáras, who are also established in the upper valleys of the Helmund and Argandab. The powerful Ghilzi tribe of Afghans inhabit a region bounded on the south by Kalat-i-Ghilzi, on the west by the Gul-Koh Mountains, on the east by the Sulimanis, and on the north by the Kabul River. This comprises the upper half of the Turnuk Valley, and the whole of the Abistada Basin. Their number is estimated by Lumsden at 200,000 souls, or 30,000 fighting men. The Durani Afghans occupy a country north and south of the road between Kandahar and Herat, which is about 400 miles long by 80 broad. This territory is bounded on the north by the mountainous slopes of the Siah-Koh, occupied by Imaks and Hazáras; on the west by the Persian frontier; on the south-west by Sistan; on the south by the Khoja-Amran Mountains; and on the east by the country of the Ghilzis. Zamindawar, north of Girishk, is inhabited by the Alizai branch of the Duranis, and these shepherds find a summer retreat in a mountainous region called Siah-band, abounding in cool and grassy valleys, which they share with the Taimuni Imaks. The Durani tribe, which includes the ruling clan of Barakzais, numbers at least 100,000 families.

The authorities for the geography of the basin of the Helmund are numerous. For the physical geography of the lower Helmund and the Sistan Lake we have the narratives of Christie and Conolly; the route of Patterson; the works of Ferrier and Khanikoff; the information given by Goldsmid, St. John, and Lovett, in the official work on Eastern Persia; and the Paper by Sir Henry Rawlinson. The *Memoirs of Baber*, and the notes in Major Raverty's translation of the *Tabakat-i-Nasri*, contain much information. Several travellers, and the officers of the first Afghan campaign, have described Kandahar, and the route thence, by the Turnuk Valley, to Kabul, while Broadfoot and Neil Campbell traversed the Abistada Basin. Broadfoot reported on the Ghilzi country and Ghazni; Dr. Kennedy gave an account of the country from the Kohjak Pass to Kandahar, and from Kandahar to Kabul; Masson's and Vigne's journeys led them over the same country; General Lynch explored the valleys of the Turnuk and Argandab; and

the Lumsden Mission to Kandahar resulted in the collection of a large mass of useful information. Still, the greater part of the Helmund Basin is entirely unknown, including the Siah-Koh and nearly all the Koh-i-Baba mountains, several hundred miles of the courses of the Helmund and of the Argandab, a great part of the Abistada Basin and the valley of the Arghesan. This, and the two former papers on Afghan geography, are intended as a review of our existing knowledge, to which great and important additions are certain to be made by Major St. John, Captain Holdich, and other zealous geographers and explorers now serving in Afghanistan.

A description of the valleys of the Upper Oxus, of the Murghab, and the Heri-Rud, would complete this view of the geography of Afghanistan, and I trust that an abler hand may undertake the preparation of such a paper, as a contribution to some future number of our 'Proceedings.'

Books and Memoirs on Zulu-land.

(By E. C. RYE, *Librarian R.G.S.*)

THE following list of books and memoirs is not intended as an exhaustive one, for which both time and material are insufficient. It is hoped, however, that it may contain enough to satisfy the present demand for authorities on Zulu-land and its inhabitants. As in the case of the maps of the region, the works quoted are for the most part wanting in precision and scientific value, and their contents are so varied as to render classification difficult. It may be remarked, that Walmsley's 'Ruined Cities of Zulu-land' is practically a work of fiction. General historical accounts and descriptions, with no special reference to Zulu-land, will be found in Hall's 'Manual of South African Geography' and Noble's 'South Africa, Past and Present.' The general, historical, and political view is discussed in Lieut. D. Moodie's 'Record,' a series of official papers relative to the condition and treatment of native tribes, from 1649 to 1838 (Cape-town), supplemented by our own Parliamentary Blue-books, of which those numbered C. 1961, 1980, 2000, 2079, 2100, 2128, 2144, 2220, and 2222 (some with maps) specially refer to present affairs.

Alberti, Lodewyk.—*De Kaffers aan de Zuidkust van Afrika, Natuur en Geschiedkundig beschreven.* te Amsterdam (Maaskamp): 1810, 8vo., pp. 260, map, pls.

—Description physique et historique des Cafres, sur la côte meridionale de l'Afrique. Amsterdam (Maaskamp): 1811, 8vo., pp. 255, map, pls. The author accompanied General Janssens to the Cape in 1802, and after being stationed at Algoa Bay, acted as Landdrost in the Uitenhage district, from which he appears to have made several expeditions into Caffraria. His descriptions apply vaguely to the natives of the whole coast as far as the Portuguese possessions; but are probably only applicable to the immediate Cape district.

Angas, G. F.—*Kafirs illustrated, with Sketches of Scenery in the Zulu Country, Natal, and Cape Colony.* London: 1849, fo., portrait, 30 coloured pls., woodcuts. Includes drawings taken among the Amazulu, Amaponda, and Amakosa.

Arbousset, T.—*Relation d'un Voyage d'Exploration au Nord-est de la Colonie du Cap de Bonne Espérance.* Paris (Bertrand): 1842, 8vo., pp. 620, map, pls. The author visited South Africa with M. F. Daumas in 1836. A chapter (xvi.

pp. 237-324) is devoted to a description of Zulu-land, containing a list of the twenty-six regiments of the native army at that time, with their officers, and a native poem upon King Dungaun, with translation. An English translation of this work by J. C. Brown was published at Cape Town in 1846, and another in London in 1852.

Aylward, A.—The Transvaal of to-day. Edinburgh (Blackwood): 1878, 8vo., pp. 440, map. Describes Zulu tactics in war.

Baldwin, W. C.—African Hunting, from Natal to the Zambesi, including Lake Ngami, the Kalahari Desert, &c., from 1852 to 1860. London (Bentley): 1863, 8vo., pp. 451, pls., map. Chapters II., IV., and V. relate the author's experiences in Zulu-land, which, from his sketch-map, he appears to have traversed for its entire length parallel to the coast. He also visited King Panda's Kraal on the Umveloosi, and thence struck north-east to the Pongola River.

Bleek, W. H. J.—A Short Account of his Visit to Panda in the Autumn of 1876, in Petermann's 'Mittheilungen,' iii. (1857) p. 49. See also vol. ii. p. 372. Various papers, &c., by this author, such as "Zulu Legende," are not easily accessible.

Brooks, H.—Natal; a History, &c. (edited by Dr. R. J. Mann). London: (Reeve): 1876, 8vo., pp. 336, maps, pls. Contains an account of political relations and history of the Zulus as regards the Colony.

Callaway, —.—Unkulunkulu, or the tradition of creation of the Amazulu and other Tribes of South Africa (in Zulu and English). Natal: 1868, 8vo.

Colenso, Bishop.—First Steps in Zulu Grammar: an abridgment of the elementary grammar of the Zulu-Kafir Language. Ekukanyemi: 1859, 12mo.

— Three Native accounts of the Visit of the Bishop of Natal, 1859, to Umpande, King of the Zulus, with notes, translation, and glossary. Natal: 1860, 12mo.

— Zulu-English Dictionary. Pietermaritzburg: 1861, 12mo.

— Zulu Vocabulary and Phrase Book. Durban: 1865, 12mo.

— On Missions to the Zulus in Natal and Zululand ('Social Science Review,' June, 1864). London: 1865, 12mo.

Davis, Rev. W. J.—Kafir-English Dictionary. Wesleyan Mission Publication. 1872, 8vo. Includes the Zulu dialect.

Döhne, J. L.—A Zulu-Kafir Dictionary, etymologically explained, preceded by an introduction on the Zulu-Kafir language. Cape Town: 1857, 8vo., pp. xii. and 417, double col.

Drayson, Capt. A. W.—Sporting Scenes amongst the Kaffirs of South Africa. London (Routledge): 1858, 8vo., pp. 327, pls. Chapters xi. and xii. relate the author's experiences in Zulu-land.

Drummond, The Hon W. H.—The Large Game and Natural History of South and South-East Africa. Edinburgh (Edmonston & Douglas): 1875, 8vo., map, pls. Contains the hunting experiences of five years ending in 1872, chiefly in Zulu-land. The map (50 miles to the inch) gives the countries of the Amazulu, Amatonga, and Amaswazi.

— A Christmas in the Wilds of Africa. 'The Field' newspaper, London, vol. xlviii. p. 743 (23 Dec., 1876). An account of a visit to Cetewayo; the organisation and weapons, &c., of the Zulus are referred to.

— Sport in South-Eastern Africa. 'The Field,' vol. xlix. pp. 594, 615, 646; vol. i. pp. 72, 134, 196, 229, 284, and 306 (19 and 26 May, 2 June, 21 July, 4, 18, and 25 Aug., 8 and 15 Sept., 1877). Though chiefly describing the incidents of sport, this series of articles contains various details not otherwise procurable, as to the nature of many parts of the country between the Tugéla and Lorenzo Marquez, with reminiscences of Cetewayo and his family, personal surroundings, and army, &c.

Erskine, St. Vincent W.—Journey of Exploration to the Mouth of the River Limpopo. 'Journal of the Royal Geographical Society,' xxxix. (1869), pp. 233–276, map. In the course of his return journey from the Limpopo the author entered Zulu-land (p. 264) from the north-east, and traversed it by a route nearly parallel to the coast side of the Drakensberg Range, entering Natal near Newcastle, at the head-waters of the Buffalo or Myati River, an affluent of the Tugéla. He briefly describes the general character of the district.

Fritsch, G.—Die Eingeborenen Sud-Afrika's ethnographisch und anatomisch beschreiben. Breslau (Hirt): 1872, sm. 4to., pls., map. Part ii., pp. 119–148, figs. 23–29, discusses the Ama-Zulu in their ethnographical and physical relations. Their political development is described, p. 478 et seq. Peculiarities in the skull, p. 38 (figured, pl. 38). In the accompanying atlas, well-executed heads of types of Ama-Zulu are given, pls. i.–iii.

— Drei Jahre in Sud-Afrika. Breslau (Hirt): 1868, 8vo. Observations (pp. 189, 198, 216) on the ethnology of the Zulus, their kraals and graves (fig. 44).

Gardiner, Capt. Allen F.—Narrative of a Journey to the Zoolu Country, in South Africa, undertaken in 1835. London (Crofts): 1836, 8vo., pp. 412, pls., maps. This author, who visited the country with the view of opening it up for missionary enterprise, visited King Dingaan at Unkinginglove; he also went to Congella, and describes the country traversed on both occasions, from and to the Tugéla River. His lithographic views of the various prominent features are numerous and well rendered, and special attention is paid to the habits, dress, weapons, &c., of the people. The reference, at p. 99, to the king's statement, "I am but a boy, I am too young to marry," although he was then about forty years of age, is of interest in connection with the marriage prohibition referred to in Sir Bartle Frere's ultimatum.

Grout, Rev. L.—On the Phonology and Orthography of the Zulu Language, and its kindred Dialects. Journal of the Ethnological Society of London, iii. (1854), pp. 247–296.

— Zulu-land, or Life among the Zulu-Kafirs of Natal and Zulu-land, South Africa. Philadelphia (Presbyterian Publication Committee): 1864, 12mo., pp. 351, pls., map. The author was for fifteen years a missionary of the American Board in South Africa, and gives a history of the American Zulu Mission from 1834 to 1862, with particulars of other mission operations. His attention was chiefly directed to ethnological and linguistic subjects.

— Isizulu: a Grammar of the Zulu Language, accompanied with a Historical Introduction; also with an appendix. Pietermaritzburg (May & Davis), and London (Trübner): 1859, 8vo., pp. 432.

Grundemann, R.—Die Englische Kolonie Natal, und das Zulu-land. Petermann's 'Mittheilungen,' xiii. (1867), pp. 209 and 210, map viii. Explanatory observations on the map of Natal and Zulu-land (scale 1:1,500,000), which is from Grantham's survey and missionary observations.

Hamilton, Charles.—Sketches of Life and Sport in South-Eastern Africa: edited by F. G. H. Price. London (Chapman & Hall): 1870, sm. 8vo., pp. 268, pls. The author lived with the natives for many months, and describes their habits and customs, though with little precision as to localities, so that his Zulu experiences are difficult to trace.

Harris, Captain W. C.—Narrative of an Expedition into Southern Africa, during the years 1836 and 1837. Bombay (American Mission Press): 1838, 8vo., pp. 406, pls., map. The Map, which represents Africa north-east of the Cape Colony, exhibiting the relative positions of the emigrant farmers and the native tribes, includes the whole of Zulu-land. The author's personal experiences (chiefly of a sporting nature) are mostly among the Matabili. His subsequent folio work, on the wild

animals of South Africa, referred to in the 'Times' of 17th February, as containing a history of King Chaka, is purely zoological, and has only a note from Isaacs (*infra*) on the subject.

Holden, Rev. W. C.—History of the Colony of Natal, South Africa. London (Heylin): 1855, 8vo., maps, pls., pp. 463. The early Zulu troubles are here chronicled, with an account of the battle at the Tugéla in 1838 (pls. v. and vi.). The slaughter of Retief at Dingaan's Kraal is also described (pl. vii.).

— The Past and Future of the Kaffir Races. London: 1866, 8vo., map, pls. Contains an account of the history, ethnology, and language, manners and customs of the Amazulu.

Isaacs, Nathaniel.—Travels and Adventures in Eastern Africa, descriptive of the Zoolus, their manners, customs, &c., with a sketch of Natal. London (Churton): 1836, 2 vols., 8vo., pls. Describes the personal experiences of seven years, from 1825, including accounts of Chaka and Dingan.

Jeppé, Frederick.—Notes on some of the Physical and Geological Features of the Transvaal, to accompany his new Map of the Transvaal and surrounding Countries. 'Journal of the Royal Geographical Society,' xlvii. (1877), pp. 217-250, map. The map (scale 1:1,850,000) comprises also the whole of Zulu-land, of which the boundary (pp. 220 and 221), hydrography, and geology are incidentally discussed.

Leslie, David.—Among the Zulus and Amatongas: with sketches of the natives, their language and customs, and the country, products, climate, wild animals, &c., being principally contributions to magazines and newspapers. Edited by the Hon. W. H. Drummond. Edinburgh (Edmonston & Douglas): 1875, squ. 8vo., pp. 436, frontisp. Desultory papers, containing the results of a long personal experience among the two tribes mentioned, of whose domestic and political economy much detail is given. The author appears to have been personally familiar with Cetewayo and the late King Panda. (This work is now out of print.)

Mann, R. J.—The Kaffir Race of Natal. Trans. Ethnological Soc. London (n.s.), v., 1867, pp. 277-297. Incidentally includes Zulu history and ethnology.

Mason, G. H.—Life with the Zulus of Natal, South Africa. London (Longman): 1855, 12mo., pp. 232.

— Zulu-land. A Mission Tour. London (Longman): 1862.

Owen, Capt. W. F. W.—Narrative of Voyages, &c., in the 'Leven' and 'Barra-couta.' London (Bentley): 1833, 2 vols. 8vo. Vol. ii., Appendix, p. 389 et seq., contains Mr. Farewell's account of Chaka.

Perrin, —.—Kafir-English Dictionary of Zulu-Kafir Language. (? Natal): 1855, 16mo.

Roberts, J. S.—Africa and African Travels and Adventures. London (Bennett): 1878, 4to. Chapter ix. is devoted to Natal and Zululand, chiefly from Dr. Mann's notes.

Robertson, H.—Mission Life among the Zulu-Kafirs. A Memoir of Henrietta, wife of the Rev. R. Robertson, S.P.G. Missionary, compiled from letters and journals written to the late Bishop Mackenzie and his sisters. Edited by Anne Mackenzie. New edition. London (Bemrose): 1875, 12mo., pp. 244. Includes an account of the foundation of the station at Kwamagwasa in 1860, personal experiences at King Panda's in 1862, and other incidents up to the accession of Cetewayo. Other particulars of this mission are to be found in the monthly Missionary Magazine, 'The Net' (Bemrose).

Sampson, Victor.—Kafir Wars: their Origin and History. 'The Colonics and India,' 1879 (a series of articles commenced in the number for 8th February).

Sanderson, John.—Notes to accompany Sketch-Maps of the Zulu and Amatonga Countries, and of the country between Aliwal, North, and Natal. 'Journal of the

Royal Geographical Society,' xxxii (1862), pp. 335-339, map. A brief notice of the courses and formation of the rivers of Zulu-land. Changes in channels and outlets, owing to floods, are referred to. The map is from original sketches.

Shooter, the Rev. Joseph.—The Kafirs of Natal and the Zulu Country. London: (Stanford): 1857, 8vo., pp. 403, pls., woodcuts, map. The author lived in Natal, and gathered information from natives, European travellers, and published sources. Some ethnological and linguistic material is to be found in the appendix.

Schreuder, H. P.—Grammatik for Zulu Sproget, med forale og Anmerk af Holmboe. Christiania: 1850, 8vo.

Stanford's Compendium of Geography and Travel, based on Hellwald's 'Die Erde und ihre Völker.' Africa, edited and extended by Keith Johnston. London (Stanford): 1878, 8vo. Contains a short general account of the Zulus and their political relations, with some observations by Mr. A. H. Keane on their ethnology and language.

Theal, G. M'C.—Compendium of the History and Geography of South Africa. Third edition. London (Stanford): 1878, 8vo., pp. 208. Apart from general history, chapter xliii. is specially devoted to a description of Zululand.

Thompson, G.—Travels and Adventures in Southern Africa. London (Colburn): 1827, 2 vols., 8vo., pls., map. In No. 5 of the appendix, vol. ii. pp. 405-418, is an account of a visit by Lient. Farewell to King Chaka in 1825, with a sketch of the Zulu nation at that time.

Trollope, A.—South Africa. London (Chapman & Hall): 1878, 2 vols., 8vo. Vol. i. p. 306 et seq., discusses the Zulu question.

War Publications.—The Zulu Army. Compiled from information obtained from the most reliable sources, and published by direction of the Lieutenant-General commanding, for the information of those under his command. Pietermaritzburg: Nov. 1878, 8vo.

Précis of Information concerning the Zulu Country, with a map, prepared in the Intelligence Branch of the Quartermaster-General's Department, Horse Guards, War Office. Corrected to January, 1879. London (Harrison): 1879, 8vo., pp. 53. The map (scale 1 : 633,360) includes from Port Natal to the mouth of the Umlaotsi River; it shows woods, but not hills.

Maps of Zulu-land.

(By W. J. TURNER, *Map Department R.G.S.*)

No survey or even scientific reconnaissance of Zulu Land has ever been made, and all our maps of the country are mere compilations from the information of missionaries, traders, and sportsmen, who have entered it without any idea of delineating its topography. The result being, that our maps present a great diversity in the delineation of the physical features, as also in positions; and in no two cases is the same direction given to the uncertain boundary between Zulu Land and the Trans-Vaal. Besides those referred to above in connection with the books that they are intended to illustrate, the following separate maps have been published:—

Map of the Zulu and adjacent Country, compiled from information obtained by Captain Walmsley, F.R.G.S., Government Resident Agent, Natal, 1866. Scale 12 geographical miles to the inch. Of little value, beyond showing in a general manner the mountainous country and the wooded districts, and even in this respect it appears to be little more than a fancy sketch.

Rough Map of Zulu Land, for the guidance of officers commanding columns; issued by the Intelligence Branch, Quartermaster-General's Department, War Office, 1879. Scale 4 miles to the inch. No attempt has been made in this map to indicate the orography of the country, the rivers, waggon-tracks, and mission stations only being shown, with the approximate limits of the different tribes, and the probable numbers of the male populations, with the name of the chief of each district.

Zululand.—Supplement to the 'Cape Argus' of January 14th, 1879. Scale 15 miles to the inch. Including also Amaswazi and Amatonga countries. The hills are indicated in a very sketchy manner, but the character of the surface of the ground is denoted; the waggon-tracks and mission stations are also shown.

Wyld's Military Sketch of Zulu Land, the Trans-Vaal, and adjoining Territories.—Published by James Wyld, London, 1879. Scale 12 miles to the inch. Probably the best compilation of the topography of the country, from the scanty material at the service of geographers, yet issued. The edge of the broken mountainous plateau is defined, and the roads or tracks are shown, as well as the missionary settlements. The positions of the head-quarters of the four columns acting on the frontier, from which advances would be made, are plainly marked; but there is little indication of the natural difficulties which an army would meet with, from the fact that they are not known; though remarks are made on the character of the country in some places.

Johnston's War Map of Zulu-Land and adjoining Districts.—Published by W. & A. K. Johnston, Edinburgh and London, 1879. Scale 10 miles to the inch. This, as well as the following map, appear to have been constructed from the same source as the preceding one, so far as Zulu Land is concerned; but upon this map the mountains have not been inserted. In other respects, the remarks attached to Wyld's map apply equally to Johnston's. An important addition is a separate map of Southern Africa on a useful scale.

Smith and Son's War Map of Zulu Land and adjoining Countries.—Published by W. H. Smith & Son, London, 1879. Scale 26 miles to the inch. The scale of this map is small, and consequently it does not contain so much detail as the previous two; but it embraces a large extent of the surrounding country, comprising nearly the whole of the Trans-Vaal, Natal, and the Orange Free State. In Zulu Land the hills are indicated, but there are no remarks as to the character of the country. A map of Southern Africa is appended, and a small inset of the whole continent shows the relative position of the Cape Colony and Zulu Land to Great Britain. Copious notes on the physical features of the country, the origin and history of the Zulu nation, and the causes leading to the war, with other information, are printed on the back.

Map of the Colony of the Cape of Good Hope.—Prepared by A. de Smidt, Surveyor-General, 1876. Scale 13½ geographical miles to the inch. On this map Zulu Land is shown in a very general manner, without roads, and with very few mission stations.

Habenicht's Map of Natal, &c., Petermann's 'Mittheilungen,' xvii. (1876), map xi. includes North-West Zulu-land, from a missionary sketch (p. 215).

GEOGRAPHICAL NOTES.

News from Lake Tanganyika.—Letters have been received by the London Missionary Society, from Mr. E. C. Hore, the scientific Member of the Tanganyika Mission at Ujiji, dated September 17th and October 17th. The second letter announced the death, from apoplexy, of the Rev. Mr. Thomson, whose loss is a heavy blow to the small and devoted band who are engaged in the arduous task of founding centres of civilising influence in this remote region. The community of Arab traders at Ujiji, acknowledging the authority of the Sultan of Zanzibar, have treated the mission with great courtesy and apparent good will, but are resolute in forbidding it to acquire property in land, houses, or vessels, or establish a station away from their little trading settlement, where alone, they say, the Europeans, for whose safety they hold themselves responsible, can be under their protective influence. A much more suitable site for the station had been found at Kigoma, about three miles and a half from Ujiji, where there is a beautiful little bay and a native village. Mr. Hore had hired a boat—the best in Ujiji—for the intended voyage to the southern end of the lake.—An item of news of great interest to Geographers is that the Arabs report the grass in the Lukuga (Cameron's supposed outlet of the lake) as having been clean swept away in the last rainy season by the rising of the lake waters. They say it is now an outflowing river, and one of them, Abdullah, had gone down it to the Kamalondo (?) Lake, and had had an encounter with the natives. Mr. Hore had taken numerous stellar observations to fix the position of Ujiji, with the result, to use his own words, that he could make the latitude no other than what is virtually the same as Captain Speke's, viz. $4^{\circ} 54' 50''$. On Cameron's map in the 'Proceedings R.G.S.' (vol. xix. p. 73), it is $4^{\circ} 58' 3''$. As to the altitude, Mr. Hore's two boiling-point thermometers gave respectively (for the house, which is about 60 feet above the lake) 2787 and 2735 feet. According to Cameron (*l. c.* p. 251) it is 2710 feet.

None of the other European Expeditions had reached Ujiji at the date of Mr. Hore's last letters. The most advanced, in the early part of October, appears to have been the large party of French missionaries from Algiers, who had got beyond Tabora, the capital of Unyamwesi. The Abbé Debaize, leading an exploring Expedition quite independently of the missionaries, and munificently supported by the French Government, had reached M'buyunu, a few days east of Tabora, on the 2nd of October. He had so far displayed great energy and rapidity of movement, and, more fortunate than other travellers now on the road, he had not lost a man or a package. He was believed to be making for King Mirambo's as his next stage. The Belgian Expedition was moving in two parties; the first, under Lieut. Cambier, having passed Tabora on the road to

Mséné, and the second, under Dr. Dutrieux and Lieut. Wautier, being on the 28th of October near Mvuni in Ugogo. The last mail from Zanzibar brought news of a terrible disaster having happened, in Unyanyembe, to a Church missionary party on its way to Victoria Nyanza. It was reported that the caravan had been attacked by a band of robbers, and that Mr. Penrose, its leader, and sixty-two of the men had been killed.

Mr. Keith Johnston and his companion, Mr. Thomson, arrived at Zanzibar on the 5th of January. They have had the good fortune to secure, through Bishop Steere, the services of Chuma, Livingstone's favourite attendant, as headman in the Expedition they are about to undertake. Chuma has had much experience of travel in the country east of Lake Nyassa, since his visit to England after the death of his old master, and will be a most valuable assistant.

The Nordenskiöld Expedition.—According to the latest accounts, which are not so precise and authentic as could be wished, the *Vega*, with the gallant Swedish Expedition on board, lies frozen in somewhere near the East Cape of Siberia, not far from Behring Strait. It had thus nearly completed the North-East Passage when overtaken by winter, probably early in October. We learn that M. Sibiriakoff is energetically urging forward his preparations for the relief of the *Vega*. A steam-vessel adapted for such a service not being readily procurable he is having one built at Malmö, in Sweden. It is to be 140 feet in length by 25 feet beam, of 350 tons burden and 80-horse power, with guaranteed speed of nine knots, and is to be delivered on the 10th of May. Captain Sengstacke, who served as first officer in the *Germania* during the second German Arctic Expedition, is to command her. She will be fitted out for two years, and proceed to Behring Strait, via the North Pacific, making Yokohama the last coaling-place. The intention is, after rendering the required aid to the Swedish Expedition, to push forward westward along the Siberian coast to the Yenisei, and thus accomplish the North-East Passage in the inverse direction. Among the projects for assisting Nordenskiöld is the intention recently announced of Mr. J. Gordon Bennett to despatch a steamer from San Francisco, immediately after the opening of the navigation.

Prejevalsky's Expedition.—Our correspondent, Mr. E. Delmar Morgan, writing from St. Petersburg on the 1st February, says:—"I have just seen Prejevalsky start on his long journey. He was accompanied by two young officers, Eklon and Robaroffsky; the latter, a fine young fellow about six feet high, goes in the capacity of artist. They will proceed by rail to Orenburg, and thence take the route via Omsk and Semipalatinsk to Post Zaisan, where they expect to arrive at the end of February, resuming their journey early in March via Hami and Sha-chau for Lhassa. If they are fortunate and meet with no obstacles on the way from Chinese hostility, they hope to reach Lhassa by

November. Their caravan will be a large one, for the party will number ten—seven Cossacks besides the three members of the Expedition—and they will require forty camels.”

Russian Expedition to the Pamir.—M. Oshanin has sent to the ‘Turkestan Gazette’ an account of his further explorations,* and his failure to cross the Pamir steppe, or even to penetrate to the Murghab. The party left Little Karamuk on the 15th of September, and after purchasing sheepskin coats and felts at Great Karamuk, reached the Muk-su River on the 22nd. Here, in the vicinity of a place called Altyn Mazar, the Muk-su River is formed by the confluence of three streams, the Suk-sai, Kaingdy, and Sel-sai. The first road leads along the Baliand-kiik, a right affluent of the last-mentioned stream, and another proceeds straight along the Sel-sai itself. At the sources of the Baliand-kiik there are two passes, the Kok-sui-bel on the east leading to Karakul, and the Takht-i-Kurum on the south leading to Poliz, Tash-kurgan, and to the Murghab River. The party took the Sel-sai route, which was rather a difficult one, but offered no extraordinary impediment. M. Oshanin considers the road might be improved without much labour. From Altyn Mazar to Poliz is a distance of 100 versts, totally devoid of population, and on the 24th of September the party set out from Poliz along the Sel-sai, which issues from an enormous glacier 13 versts from Altyn Mazar and flows due north. The glacier is about 2 versts across and almost wholly blocks the way, filling two valleys which join near its extremity. M. Oshanin describes the lower end of the glacier as remarkably grand, and as terminating in a sheer ice wall of about 240 feet. To this splendid natural feature he gave the name of Fedtchenko glacier. Having turned the glacier, they proceeded along the Baliand-kiik, but further exploration soon proved impracticable. The defile narrows most abruptly, and the road turned into a lateral ravine, and leading over two difficult spurs, descends again to the Baliand-kiik. Then for about a verst the party passed along the bank of the river through a most extraordinary labyrinth of boulders, after which a terribly steep ascent commenced. Further on, a gorge crossed the road at right angles, and the path afforded barely enough room for a foothold. Many accidents, too, befell the pack animals in their progress, and M. Oshanin was reluctantly compelled to abandon all idea of any further advance, and to return to Altyn Mazar, which was reached on the 27th of September. Here gold is obtained in small quantities from the river, and disposed of at Marghilan. M. Oshanin proposed to cross the Taldyk and reach Osh by way of Guleha about the end of October.

Internal Communication in Japan.—Sir Harry S. Parkes, Her Majesty’s Minister at Yedo, having called upon the British Consuls in Japan to

* See ‘Proceedings R.G.S.’ for January, pp. 64–66.

assist him in the investigation of an important subject of inquiry, viz. the internal transport of the country, its cost, the means of transport, &c., several reports, embodying a considerable amount of information, were sent in, and have now been published by the Foreign Office. The notes furnished by Mr. J. C. Hall, of the Yokohama Consulate, supply some details of general interest on the subject, as regards the principal island of the group. Japan, he observes, is very unfavourably circumstanced in respect of facilities for transport, its physical conformation being prejudicial to it in two ways. A chain of high mountains running along its whole length occupies the centre of the main island, making communication across the country exceedingly difficult, and preventing the formation of any considerable rivers. So effectual is the barrier thus formed, that the produce of the fertile districts of the west coast has to make a circuit of half the island in junks to reach the ports and markets of the east coast. Very little has been done by art to remedy these disadvantages, and there are few good roads in Japan, and still fewer canals. The large national highways, such as the Tokaidô, Naga Sendô, and others, were constructed more with a view to administrative and military requirements than for the convenience of commercial transport. They run, as Mr. Hall puts it, lengthwise of the island, mostly parallel to the central mountain chain; hence they are not much availed of for the transport of goods of great bulk or quantity, owing to the cheapness of carriage by sea. Next to these great highways come a class of roads, now known as *ken* roads, which were originally made by, and for the convenience of, the old feudal Daimies and their retinues in their journeys to and from the capital; they serve principally as feeders of the foot-passenger traffic to the main highways. There is a third class known as the village roads, which are made at the expense of the villages for the convenience of communication and transport of produce; but they are in general badly designed and ill-made, in many places becoming mere mountain tracks. Narrow and ill-constructed as they are, however, it is by means of these village roads that most of the land transport of the country is carried on. The means of conveyance are in keeping with the character of the roads. Wheeled vehicles are very little used; horse-carts or waggons are altogether unknown, the only wheeled conveyance being a primitive description of bullock-waggon. The pack-horse is the usual means of transport all over the country, but bullocks are also used as beasts of burden, especially in the mountainous districts.

The Loochoo Islands.—These islands are situated to the south of Japan, between lat. $26^{\circ} 10'$ N. and $28^{\circ} 46'$ N., and long. $126^{\circ} 30'$ E. and $129^{\circ} 40'$ E., and are claimed as tributary by both China and Japan. The distance from the northern point of the group to the southern point of the Japanese island of Kiusiu is about 160 geographical miles. The name of the island is written Liuchiu or Liukiu, according as the northern or southern Chinese dialect is adopted, while the Japanese call

them Riu-Kiu; but it will be more convenient to use the term Loochoo, by which they are best known to foreigners. Though brief visits have been occasionally paid to the islands by foreign vessels—notably by H.M.S. *Alceste* in 1816—little has recently been heard of their inhabitants; this circumstance lends additional interest to an account of a recent visit to them by an American traveller from Japan, of which the following is a summary. Late in the autumn the temperature of the islands is pleasant, the group being in about the same latitude as Key West, Florida; but in the summer it is exceedingly hot. The natives are a very intelligent-looking and apparently healthy people, and in disposition are mild and kind. In general appearance they resemble the Malays, though they are of a lighter hue. Their dress is similar to that of the Japanese. The men wear their hair twisted into a knot or loop, fastened by two hair-pins or skewers, which are made of gold, silver, or brass, according to the social position of the wearers. There are no arms of any kind on the islands at present, and the little kingdom has enjoyed the blessings of peace for many centuries. Murder is entirely unknown, and in fact crime of any kind is uncommon, though the people sometimes get quarrelsome, and wrestle, kick, &c., but even such occurrences are said to be rare. The women work very hard, even field-labour falling to their lot. They also do most of the carrying, poising their loads on their heads, which gives them an erect carriage, and enables them to show off their fine figures to advantage. They wear a loose garment of thin material, the arms being bare to the elbows, and the legs nearly to the knees. The lower classes never wear shoes of any kind, and the higher orders use only sandals made of straw or grass. The women who live in the towns are continually employed in spinning and weaving, and in dyeing cloth, which is the only article of any importance manufactured in the islands. The fabric is mostly cotton, though sometimes linen is used, and occasionally silk. Their dye, which is of various shades of blue, never fades. The hands of the women—many of whom are handsome—are tattooed with ink, the process being begun about their fifteenth year, and the design is enlarged as they grow older, so that, by the time they are thirty years old, their hands look as if they had been dyed. They coil their hair on the top of the head, and fasten it with a single hair-pin. The matrimonial customs of the Loochoo islanders are peculiar, the mother of the bridegroom being the judge of the merits of the bride-elect. When the latter is brought home she has to work very diligently to please her mother-in-law during the month of probation, as otherwise she is sure of rejection. Funerals are conducted with great ceremony, and mourning women take part in the procession, their numbers varying according to the rank and wealth of the deceased. They have their heads enveloped in thick veils, and are usually supported by a friend on each side. The corpse is placed in a tomb or vault, the tub in which it is contained being left

open, and watchers are stationed outside, whose duty it is to go to the door of the tomb from time to time, and to ask if the corpse requires anything. These inquiries are kept up for three days, after which the tomb is closed and the door plastered over, the mourners then returning home. The tombs, it may be mentioned, are usually built on the side of a hill, with the door at the lower end. The products of the islands are few, and consist principally of sugar, cotton, and sweet potatoes. Sugar is the only export besides the cloth alluded to before, which is much liked by the Japanese. The people eat beef, pork, goats' flesh, fowls, and eggs, and altogether are better fed than the Japanese. The chief imports from Japan are rice and tea, which are used by the middle and upper classes only. It may be interesting to add, in conclusion, that there is still an old tombstone to be seen in the Loochoo Islands, bearing the following inscription in old English letters:—"William Jones, seaman of Her Britannic Majesty's ship *Alceste*, aged 21 years, lies buried here: 15th October, 1816. This monument was erected by the king and inhabitants of this most hospitable island."

Survey for proposed Trans-Continental Railway in Northern Australia.—During last summer an Expedition was organised by the proprietors of the 'Queenslander' newspaper, to make a flying survey of a proposed trans-continental railway from Blackall, in Queensland, to Port Darwin, in the Northern Territory of South Australia, the idea being that the line should be begun simultaneously at both ends, and a junction effected at the boundary on the 21st parallel of latitude. It was hoped that the survey might be completed by the end of 1878. By a letter from the Brisbane correspondent of the 'Colonies and India,' dated December 3rd, we learn that Mr. Scarr, a well-known explorer, in returning to Queensland from Charlotte Waters, met the survey party on the 21st parallel in South Australian territory, and brought advices from them down to September 27th. The report is that the direct north-west route for the proposed railway so far presents no difficulties, though the party passed through a long stretch of badly watered country, and had several times to dig for water. The Expedition expected to reach Daly Waters by the end of November, and the members were all well and in good spirits.

Survey of the Yellowstone National Park of the United States.—From Dr. F. V. Hayden's 'Preliminary Report of the Field Work of the U.S. Geological and Geographical Survey of the Territories for the Season of 1878,' we learn that the second division, under Mr. H. Gannett, was entrusted with the work of making a detailed geological and geographical survey of the Yellowstone National Park. One section of the party made the general survey, while the other was engaged in making detailed studies and maps of the geyser and hot-spring localities, a work of great interest and value to the scientific world. Material has been collected for a map (on the scale of a mile to an inch) of the park, the area of which is about 3500 square miles. Its

surface is mostly level or rolling, with several groups or short ranges of mountains scattered about. Along the eastern side, and forming the watershed between the Yellowstone and Bighorn rivers, stand the rugged volcanic peaks of the Yellowstone Range. Nearly the whole of the park is covered with a dense growth of magnificent pine timber. The mean elevation of the region above the sea-level is between 7000 and 8000 feet, which implies too cold a climate to admit of agriculture, except in certain very limited localities, and grazing land is found only along the northern border and in small patches of a few acres each. There are not, so far as is known, any mines or mineral deposits in the park. A good road extends from Bozeman, Mont., to the White Mountain hot-springs, and thence there are excellent trails to Amethyst Mountain, Yellowstone Falls and Lake, the Mud Geysers, and other objects of interest on the Yellowstone River and the Geyser Basins. Mr. W. H. Holmes, the geologist of the division, sketched every square mile of the park in such detail that the economic resources, as well as all the minor features of the geology, can be laid down on a map on a scale of one mile to an inch with the greatest minuteness.

Geographical Societies of the World.—In his usual annual review of geographical societies and geographical publications, in the 'Geographisches Jahrbuch' of Gotha, Dr. Behm records the large increase for the year 1878 of eight in the total number of societies. There are now no fewer than fifty geographical societies in the world, the great addition to the number made during the past few years being due in some degree to the awakening of the French to the practical importance, of the study consequent on the events of 1870-1, seven new societies having been founded in France, besides one in Algiers, since that date. But the interest shown in the subject is manifested almost as strongly in other more distant quarters. New societies have during the last decade sprung up in Spain (Sociedad Geografica de Madrid, now numbering 550 members); Portugal (Sociedade de Geographia de Lisboa, 199 members); Bucharest (Societatea Geographica Romana, 220 members); Cairo (Société Khédeviale de Géographie); Lima, Omsk, Stockholm, Quebec, and many other places. In the useful statistical table given by Dr. Behm, the list of societies is arranged in the order of date of foundation, by which we learn that the oldest of these institutions is the Société de Géographie of Paris, founded in 1821, and that the Royal Geographical Society, founded in 1830, only occupies the third place, having been preceded by the Gesellschaft für Erdkunde of Berlin, founded in 1828. In separate columns are given respectively the number of effective (i.e. paying) members, the income, Government grant, and the capitalised fund of each society. In number of members our own Society distances all its contemporaries, with its 3334 members, being followed by Paris with 1700, the Italian Society with 1476, the American Society of New York with 1200,

the Society of Commercial Geography of Bordeaux with 1120, Amsterdam 924, Copenhagen 900, Brussels 831, Berlin 730, St. Petersburg 664, and so forth. It must be noted, however, that the aggregate of members in the numerous societies in France far exceeds that of any other nation. In annual income the Royal Geographical Society also takes the lead, the total being given by Behm as 7950*l.*, the Society of St. Petersburg coming next with 6675*l.*; but the much larger Government grant of the latter, 2423*l.*—the London Society figuring for 500*l.* only—here forms an important element.—With regard to geographical publications, Dr. Behm registers a marked increase in their number, many of them originating in private enterprise, and depending for their support on the general public. No less than twenty new geographical journals have sprung into existence since the end of 1876. Dr. Behm remarks that the growing interest in geographical subjects is far more clearly displayed by this rapid increase in the periodical literature devoted to them than in the formation of new societies.

Obituary.

Admiral Sir William Hutecheon Hall, F.R.S., K.C.B.—Another of the distinguished members whose loss the Society has had to deplore since the last annual record, is Admiral W. H. Hall, one of those heroic spirits of whom England is so justly proud. He had attained his eightieth year when he died, on the 25th of June last. His public services were so lengthened, connecting the old war with that of 1854–56, and were also so varied, that a mere outline is all that can be attempted in this place.

The late Admiral entered the Navy as a volunteer of the first class (cadet) in 1811, on board the 74-gun ship *Warrior*, Captain the Hon. G. Byng, and was actively engaged in the Baltic, North Sea, and Channel. In 1816–17 he served, as midshipman, under the celebrated Captain Basil Hall, with whom he attended Lord Amherst's embassy to China, his reminiscences of which, especially with reference to his visit to Corea, were given on more than one occasion at the evening meetings of our Society. He continued to serve without intermission; on one occasion attacking with boats and capturing a well-armed slaver, on another aiding in the capture of a piratical vessel; and displayed his courage and humanity by twice saving life by jumping overboard. In 1832 he witnessed the establishment of King Otho on the throne of Greece. From Mehemet Ali, the Pacha of Egypt, he, in common with a few other English officers, received the gift of a sword.

After a year devoted to the study of steam machinery, we find him, in 1840–43, commanding the Honourable East India Company's war steamer *Nemesis* (for which service he was lent by the Admiralty), and employed, during the first war with China, upon the coasts and rivers of that country. The *Nemesis* was the first iron steamer to round the Cape of Good Hope, but she very narrowly escaped foundering: during a hurricane her iron sides were torn open, the cracks extending from the deck down to, and even below the water-line.* On several occasions she owed her safety to the peculiarity of her construction, in water-tight compartments. She commenced

* Vide 'The *Nemesis* in China,' pp. 18–24.

her distinguished career by an attack on the forts of Chuenpee, and the annihilation of eleven war junks, the flower of the Celestial Navy. So actively was she engaged, that her commander was present in *twenty-one* engagements, in one of which he seized and threw overboard an ignited shell-rocket; an act of personal heroism, worthy the Victoria Cross, but which maimed his right hand for life. He was *nine* times mentioned with distinction in despatches. He also received the thanks of the Governor-General of India in Council; and, ere they parted, a presentation sword from his well-tryed crew. So numerous, successful, and daring were his exploits, that the name of "Nemesis Hall," by which he was ever afterwards honourably distinguished, became a household word.

Such brilliant services could not be recognised in the ordinary way: he was made commander, by an Order in Council, in 1843, being also appointed to the Queen's yacht; and captain in 1844.

In 1845 he married the Hon. Hilare Caroline Byng, daughter of the late Vice-Admiral Lord Torrington, under whose command he had first gone to sea. He had sometime previously to this turned his attention to the wrongs of seamen ashore; and he now set himself to the founding of sailors' homes, with an energy and hearty zeal, which never flagged. He was the first who practically waged successful warfare against those "land-sharks," who make the sailor their prey. The wide development which this movement has assumed, must be attributed chiefly to his powerful advocacy—not fewer than twenty-one of the existing sailors' homes in the United Kingdom, besides several in our colonies, owing their origin to his great efforts—efforts which have endeared his memory to the hearts of many thousands of our seamen, who have benefited by them. For twenty-six years he was an active supporter also of the Shipwrecked Mariners' Society.

During the Russian war, 1854–55, he commanded the *Hecla*, of 6 guns, and the *Blenheim*, 72 guns, in the Baltic; took an active part in the destruction of Eckness, where he was again wounded, and in the capture of Bomarsund; in short, no inconsiderable proportion of our successes in the Baltic was due to his exertions. For these services he was honoured by a communication from Her Majesty, conveying the expression of "Her personal feelings of approbation of his conduct in his late engagement." The Grand Duke Constantine also expressed himself as follows to one of the lieutenants of the *Tiger*, after the capture of that ship by the Russians:—"Of all the bold and seamanlike operations, this of Captain Hall taking his ship seven miles up a creek of intricate navigation, in an enemy's country, is the most daring I could have imagined. I cannot but admire such gallantry even in an enemy."

He received the Companionship of the Bath in 1856, and was made K.C.B. in 1867. In 1863 he became a Rear-Admiral; in 1866 he retired from active service, and received his promotions as Vice-Admiral and Admiral in 1869 and 1875. In 1871 his services were recognised by the bestowal of a good service pension. In 1847 he was elected a Fellow of the Royal Society, and in 1853 he became one of our members, serving afterwards for several years on the Council.

Although the Admiral seldom wrote at any length, yet his intelligent suggestions for the development of "our National Defences," obtained a wide-spread circulation. On such matters as arming merchant steamers, or employing fishermen and boatmen as part of our Naval Reserve, he elicited the warm approval of some of our most thoughtful officers. The defence of the Firth of Forth, which he strongly advocated, is now in course of execution. It is to be hoped that the harbours of refuge on our east coast, which he also recommended, may likewise be carried into effect, and thus add to the imperishable memorials with which his name is already associated.

The late Admiral was undoubtedly a man of no common type: unsurpassed

courage and energy were in him united to a spirit of philanthropy, tenderness, and generosity, such as is rarely equalled. Perhaps the predominant features of his character were its amazing force, and inflexible honesty of purpose. As an officer, a sailor, and a noble-minded English gentleman, Sir W. Hall has left no superior.

M. Nicholas de Khanikoff, Honorary Corresponding Member of the Society, and gold medallist of the Société de Géographie of Paris, was born in Russia on the 24th October, 1829. After completing his education at the Lyceum of Tsarsko-selo, near St. Petersburg, he entered in December, 1836, the Ministry of Foreign Affairs, and was thus placed in favourable circumstances for devoting himself to the line of study in which he was destined to distinguish himself. In 1842 he accompanied Buténieff's mission to Bokhara, and on this occasion visited Samarkand, being the first European in modern times to enter that venerable city. In the following year he published his 'Description of the Khanate of Bokhara,' in Russian, a work that was translated into English in 1845 by Baron de Bode. For many years M. de Khanikoff resided in Northern Persia, in the official capacity of Russian Consul at Tabriz, and it was during his tenure of this office that he collected the materials for his map of Azerbaijan, of which the late Sir Roderick Murchison said, in one of his anniversary addresses, that it filled-in topographical details in Persian Kurdistan and completed the researches of his predecessors in the same field—Generals Monteith and Rawlinson. He was afterwards attached to the staff of Count Bariatinisky, at Tiflis, and whilst there planned an expedition into Eastern Persia and the districts of Herat and Sistan. This, which was afterwards known as "the Khorassan Expedition" included the names of Lenz, Bunge, Count Keyserling, and Goebel, and the results of their labours were published in various scientific journals. M. de Khanikoff's work, 'La partie méridionale de l'Asie Centrale,' appeared, in Paris, in 1861. His 'Ethnographie de la Perse' was another important contribution to the literature on this country.* In the preface its author states that although his personal observations had been limited to particular parts of Persia, yet in order to do justice to his subject he had felt bound to include the whole country in his treatise. His last geographical work, undertaken at the request of the Imperial Geographical Society, was the translation of Ritter's 'Iran,' forming vol. vi. of the Russian annotated edition of the 'Erdkunde von Asien.' For many years de Khanikoff resided in Paris, where he acted as agent of the Minister of Public Instruction. Here he continued his favourite literary pursuits, passing his summers in the environs of the capital, where he died, at Rambouillet, on the 15th November last year, regretted by a large circle of friends and acquaintances. In 1874 Nicholas de Khanikoff paid the last of his numerous summer visits to England, attending, as he had frequently done before, the meeting of the British Association of that year. All who knew our late associate could not fail to entertain a high regard for his great ability and knowledge, and join in the regrets expressed on his decease that he has left behind him comparatively so few monuments of his genius.

Mr. Edward Coe Taintor, who died suddenly at Shanghai on the 16th of last May, at the early age of thirty-six, entered the Chinese Customs service in August, 1865, and became a Commissioner in October, 1873. On his arrival in China our Associate applied himself with great diligence to the study of the language and the country generally, and he soon became a contributor to 'Notes and Queries on China and Japan' (1867-8), and afterwards to other local periodical literature. Several of the Trade Reports made by Mr. Taintor in his official capacity, contain matter of interest from a geographical point of view. Apart from these he published

* Besides these, mention should be made of an article on Meshed, in the 'Tour du Monde' for 1861.

very useful contributions to our knowledge of the two great islands of the Chinese Empire—Hainan and Formosa—in pamphlets entitled, 'A Geographical Sketch of the Island of Hainan' (1868), and 'The Aborigines of Northern Formosa' (1874). The latter was read before the North China Branch of the Royal Asiatic Society, and appeared in their journal. Mr. Taintor had latterly been Statistical Secretary to the Inspectorate General of Customs, residing at Shanghai, and the annual reports of trade at the treaty-ports were issued under his superintendence. He had been a Fellow of our Society since November, 1866.

Mr. W. O. Hirst, Consul for Uruguay at Manchester, died on the 12th of January, at San Juan, Puerto Rico, of gastric fever. Although he had not published any geographical work, he was a great traveller, and had performed many hazardous journeys. The most important of these was across the South American continent from Rio Janeiro to Coquimbo in Chili, proceeding from San Paulo to Corrientes, on the Paraná, and thence across the Argentine Confederation, *via* Santiago and Rioja; completing the traversal in nine months. He made a botanical collection during the journey, and took notes of the various countries and peoples. He was elected Fellow of the Society in 1876.

CORRESPONDENCE.

1. *The Longitude of Pará.*

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
WASHINGTON, D.C., *January 16th, 1879.*

To the Editor of the 'Proceedings R.G.S.'

I HAVE just read in the 'Proceedings of the Royal Geographical Society' for January, your notice of the Amazon Survey by Commander Selfridge, U.S.N., and beg leave to correct a typographical error in the account of the survey in the 'New York Herald' of October 23rd, 1878, where the longitude of Pará adopted by Commander Selfridge is given as $48^{\circ} 59' 15''$ instead of $48^{\circ} 29' 15''$. The latter will undergo a correction of $50''$ for the meridional difference between Fort Villegagnon and the Imperial Observatory at Rio de Janeiro, upon which the Brazilian longitudes are based, when by oversight the distance was computed from Fort Villegagnon.

I beg leave also to state that the Brazilian Atlas of Captain Azevedo was well known to this office, and that a copy of it was supplied to Captain Selfridge. Some important differences from the latter will be found in the charts of the expedition now being prepared for publication, owing for the most part to changes of the bed of the river and its channels.

Your obedient servant,

S. R. FRANKLIN,
Captain U.S.N. and Hydrographer.

2. *African Overland Telegraph.*

5, PUMP COURT, E.C., *February 7th, 1879.*

To the President of the Royal Geographical Society.

SIR,—In the 'Proceedings of the Royal Geographical Society' for this month, it is stated in reference to an overland telegraph through Africa, "the scheme was first mooted at the conference of Geographers on African exploration and civilisation,

which met by the invitation of the King of the Belgians in September, 1876." If you will refer to the 'Colonies' (now the 'Colonies and India') of May 15th, September 18th, October 16th, 1875, to the 'English Mechanic,' November 26th, 1875, and to the 'Colonies' of August 5th, 1876, you will find letters from me advising the construction of this line of telegraph; and you will also find, by a reference to the published 'Proceedings of the Royal Colonial Institute,' that, on the 18th of June, 1876, during the discussion on a paper by Lieut. Cameron, I brought the same subject before the Institute. I shall be glad if you will have the above-quoted statements corrected in the next number of your 'Proceedings,' and I particularly desire this as Mr. Kerry Nicholls derived from me all the information on the subject that he communicated to your Society.

Your obedient servant,

H. B. T. STRANGWAYS.

[The words "first mooted," as will be seen on reference to the preceding sentence ('Proceedings,' Feb., p. 123), apply only to the part taken by the Society in the matter.—ED.]

REPORT OF THE EVENING MEETINGS, SESSION 1878-79.

Fifth Meeting, 27th January, 1879:—Sir RUTHERFORD ALCOCK, K.C.B.,
Vice-President, in the Chair.

ELECTIONS.—*A. A. Annesley, Esq.* (H.M. Consul at Réunion); *Navig. Lieut. Chas. Wm. Buillie; Rev. J. C. Bates, M.A.; F. Culling Carr-Gomm, Esq.; Wm. Edmund Crothers, Esq.; Lieutenant Llewellyn S. Dawson, R.N.; Lieut.-Colonel Bonar Deane; Philip Septimus Dowson, Esq.; John Frazer, Esq.; Rev. George Maxwell Gordon; Frederic John Keeling, Esq.; William Fredk. Laxton, Esq.; Alfred Wm. Maberly, Esq.; Rev. Thomas Mann; Owen Philbbs, Esq.; Albert E. Pirkis, Esq.; Sir Arthur Douglas Scott, Bart.; Arthur T. Simpson, Esq.; Lieutenant François Alphonse Spuhler; Robert Thornley, Esq.; The Right Rev. Herbert Vaughan* (Bishop of Salford); *Lieut.-Colonel A. H. Wavell; Thos. Augustus Yarrow.*

A paper was read entitled "The Road to Merv," by Major-General Sir H. C. Rawlinson, K.C.B., F.R.S. (*ante*, with discussion, pp. 161).

Sixth Meeting, 10th February, 1879:—The Right Honourable the Earl of
DUFFERIN, K.P., President, in the Chair.

PRESENTATIONS.—*F. Culling Carr-Gomm, Esq.; George Quin, Esq.; Charles Edward Solomon, Esq.*

ELECTIONS.—*John James Carey, Esq.; Charles Henry Eden, Esq.; Sydney Gedge, Esq.; Rev. Joseph Claudius May; George Quin, Esq.; Charles Edward Solomon, Esq.; Edmund Street, Esq.; Robert White, Esq.; Augustus White, Esq.; Robert G. Webster, Esq.*

The following papers were read:—

1. Explorations inland from Mount Cameroons, and Journey through Congo to Makuta. By the Rev. T. J. Comber.

2. The Bamangwato Country. By (the late) Captain R. R. Patterson.

The second paper was read by Sir Henry Barkly, K.C.B., who supplemented it with remarks of his own, and a brief account of the circumstances attendant on the melancholy death of the author. (Both papers, with discussion, will be published in the Number of the 'Proceedings' for April.)

On the termination of the ordinary business of the evening the President, LORD DUFFERIN, addressed the Meeting as follows:—

It is now my unpleasant duty to conclude this meeting by expressing to the Society my extreme regret that circumstances over which I have had no control* will compel me to resign the short-lived honour to which by your suffrages I have been so recently promoted. I can assure you that it is with very great regret that I make this announcement; and although there are many circumstances which may render my leaving my native country, after so short a period of residence within it, a matter of great regret, there is nothing which I feel more deeply than that it should entail upon me the resignation of your Presidential Chair. I regret extremely that it should have been absolutely impossible for me to have appeared more frequently at your meetings. I knew beforehand that circumstances would compel me to be absent at the commencement of the session, but I had always counted upon returning on this very day, and from this time forward devoting my best energies to your service. From this pleasure, however, I am debarred, and I have only left me the melancholy satisfaction of knowing that, when at length I may return to find a seat upon those benches, there will be few of your explorers who will have had a longer experience of the characteristics of an Arctic climate than myself.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—Special Meeting in honour of MM. Savorgnan de Brazza, Dr. Ballay, and Quartermaster Hamon, of the Ogowé Expedition, January 24th, 1879.—The Baron DE LA RONCIÈRE LE NOURY in the Chair.—The meeting was held in the grand hall of the Sorbonne, which was filled with the numbers gathered together to render homage to the distinguished travellers. The travellers having been formally presented to the Meeting by the President, M. de Brazza delivered an address, in which he recounted the leading incidents and results of the exploration, which carries our knowledge of the geography of this part of Africa from the upper basin of the Ogowé to the basin of the Congo, two of the northern tributaries of which were discovered. Much enthusiasm was manifested by the audience, and the meeting was brought to a close by a complimentary speech by the President.

February 7th, 1879.—M. DAUBRÉE in the Chair.—It was announced that the Geographical Society of Lyon had decreed a gold medal to M. Savorgnan de Brazza, a silver medal to Dr. Ballay, and a bronze medal to Quartermaster Hamon, of the Ogowé Expedition. Further news was reported of the progress of Captain Rondaire in his investigation of the subsoil at Gabes, separating the depressed *chotts* of the interior from the Mediterranean. He had bored to depths of 30 and even 56 metres, without finding the slightest trace of rock, all being loose sand.

Special Meeting, Centenary of the death of Captain Cook, February 14th, 1879.—The Baron DE LA RONCIÈRE LE NOURY in the Chair.—The walls of the large hall in the Society's own building, in which the meeting was held, were hung with drawings and original maps of the voyages of Cook, and on the tables were exhibited under glass cases numerous objects having belonged to the great navigator, and specimens of the workmanship of the Polynesian Islands explored by him. The hall was crowded to excess. Mr. R. Vickers Boyle, c.s.r., the delegate of the Royal Geographical Society, was present, and took his seat in the bureau. The President opened the meeting by recalling in a few words the memories of the great man in whose honour they were assembled together, and made allusion to the unfortunate

* In allusion to his recent appointment as Ambassador to St. Petersburg.—[ED.]

event which had cut short the career of the illustrious sailor just one hundred years ago. He (the President) then thanked Dr. Hamy, who had first suggested the idea of celebrating this anniversary, and taken an active part in the organisation of the Exhibition, and called upon the three speakers who had undertaken to deliver addresses on the occasion. The first was by M. WILLIAM HUBER, "On the Chief Events in the Life of Cook." He spoke of the sterling character of the man who succeeded in rising from a humble position to a high grade in the British Navy, and became commander-in-chief in three Expeditions of Discovery round the world, a Fellow of the Royal Society and the recipient of a gold medal for his hydrographic memoirs. In his first voyage in the *Endeavour*, which lasted three years, he visited Tahiti, thoroughly explored the coast of New Zealand, and discovered Australia. His second, in the *Resolution* and *Adventure* (1772-1775), had for its main object the examination of the supposed Antarctic Continent, in carrying out which he penetrated several times to $71^{\circ} 10' S.$ lat., and also added considerably to his former discoveries in the Australian seas. In his third (commenced July 11th, 1776), in the *Discovery* and *Resolution*, he visited for the third time New Zealand and Tahiti, and proceeding thence to the west coast of North America, passed through Behring Strait, and attempted to reach Europe by the seas of Arctic America, but being stopped by the ice, he turned south to the Sandwich Isles, where he met with his death, whilst still young, on the 14th of February, 1779. In conclusion, M. Huber dwelt on the great traits of Cook's character—his wonderful tenacity of purpose, his intelligence, his benevolent care of his men, resulting in the immense improvement he effected in naval hygiene, and the noble qualities of his heart as shown in all his acts. Dr. HAMY spoke next "On the Geographical Results of Cook's Voyages," giving first a general view of the knowledge possessed of the Pacific and Southern Seas before that time, and dilating on the great scientific dispute of those days between Cook and Dalrymple, the partisan of the existence of a Southern Continent, the famous *Terra Australis incognita*. The third speaker was M. CROSNIER DE VARIGNY (formerly Foreign Minister to the King of Hawaii), his subject being the Progress of Civilisation in Oceania. He said that on the same beach of Kealakekua, where Cook was killed, the lineal successor of the old barbarous chiefs had recently distributed charitable aid and sympathy to the sufferers from a volcanic eruption. In tracing the progress of Christian civilisation throughout the various parts of the Pacific, he paid a tribute to the efforts of the missionaries. He described the present condition of the Sandwich Islands.—At the conclusion of the address, Dr. Hamy described to the Meeting some of the principal objects exhibited in the hall, such as maps and journals in Cook's handwriting, and water-colour drawings by the artists attached to the three Expeditions. Some of these had been obligingly lent by the Hydrographer to the Admiralty in London.

Geographical Society of Berlin.—February 8th, 1879: Dr. NACHTIGAL, President, in the Chair.—The President informed the Meeting that, from communications received at the French Foreign Office, it was tolerably certain that the German botanist, Dr. C. Rutenberg, of Bremen, had been murdered on his last journey through Madagascar. Dr. Rutenberg had originally left Germany on a Botanical Expedition, at his own cost, to South Africa. From Cape Town he had travelled through Transvaal and across the Drakenberg; but the chief object of his voyage being Madagascar, he had soon after embarked for Nossi Bé. From the adjacent coast he had traversed the northern part of the island to Vohemar, recrossing to Majunga on the North-west coast, and thence starting for a longer journey through the interior. He proceeded to the capital, Antananarivo, and thence investigated the Central Ranges of Ankaratra, reaching their summits and the banks of Lake Hassi. Returning to Antananarivo, he turned, in the beginning of 1878, westward, and explored the left bank of the Ikiopé, discovering several hitherto unknown tribu-

taries of this important river. Attacks of fever and the untrustworthiness of his native attendants compelled him to hasten to Majunga. But soon after he planned a journey from this place to the southern end of the island by an entirely unexplored route, and it was whilst thus engaged that he was assassinated.—The President then announced that the well-known traveller Dr. Hildebrandt was about to return to East Africa; the botanical and zoological exploration of Madagascar forming part of his programme. The Academy of Sciences had granted him for this purpose a portion of the Humboldt Fund.—Letters, dated the 11th and 19th December, were then read from Dr. Buchner, the new traveller sent out to West Africa by the German African Society. In them he announced his intention of proceeding on the 20th December from St. Paulo de Loanda to Dondo on the Quanza, where Major von Mechow was at present stopped by an attack of fever. The absence of news of Herr Schütt was interpreted as indicating that he had been enabled to continue his journey across the Quango.—Letters had been received from Gerhard Rohlfs, announcing his safe arrival at Sogna.—A paper was read by Dr. Güssfeld on “The Glacial conditions of High Mountains.”

Imperial Geographical Society of St. Petersburg.—January 18th, Annual Meeting.—The report on the progress of geography for the past year was read by M. Sreznefsky, the secretary. Among the deceased members noticed were MM. de Khanikoff, Dorandt, Chaslafsky, and Roussoff. The last-mentioned had just died from malignant small-pox, caught at Orenburg, at which place he had rested a day or two on his way home from Central Asia, where he had been serving as zoologist to the Middendorff Expedition. Recent Russian explorations were reviewed in some detail, one of the more important being that of Potanin in the Han-Kai Mountains, near Lake Kossogol, a range which seems never to have been previously visited by Europeans. It was also announced that Potanin's Expedition this year would be directed to the sources of the Yenisei.—The Constantine gold medal was awarded to Professor Nordenskiöld, the renowned Swedish Arctic explorer and savant; the Lütke medal was decreed to M. Severtseff, for his long services to science, and especially for his last exploits in the Alai and Pamir, where he visited Lake Riang-Kul.

Italian Geographical Society.—December 22nd, 1878; Signor MALVANO, Vice-President, in the Chair.—A paper was read by Signor L. M. D'Albertis on his later explorations in New Guinea, more particularly in Yule Island and during three journeys up the Fly River.—It was announced that the Council had decreed to Signor D'Albertis the Prince Humbert gold medal, for his important and successful researches into the geography and zoology of New Guinea. A banquet was also given during the same week in honour of this bold and successful Italian traveller. A silver medal was awarded to Signor Pietro Arnoux, in recognition of the great service he had rendered to the Italian Expedition in Shoa, by furnishing with supplies and otherwise aiding MM. Antinori, Chiarini, and Martini, when in great difficulties after being plundered by the natives.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

ASIA.

Adams, W. H.—In the far East: a Narrative of Exploration and Adventure in Cochin China, Cambodia, Laos, and Siam. London (Nelson): 1879, 12mo., pp. 210.

Cordier, H.—*Bibliotheca Sinica. Dictionnaire Bibliographique des Ouvrages relatifs à l'Empire Chinois.* Tome I., fasc. 1. Paris (Leroux): 1878, large 8vo., pp. xiv and 224, double column. (*Trubner.*)

The commencement of a work which represents the 10th issue of the “Publications de l'École des Langues Orientales vivantes.” The author, who, among

his qualifications for the task undertaken, is Secretary of the Chinese French Mission and Honorary Librarian of the North China Branch of the Royal Asiatic Society, is already known to English students by his Catalogue of the Library of that Institution. He proposes to make 5 principal divisions of the present work: the 1st comprising China proper; the 2nd, the open ports, the knowledge of China by the western peoples according to Roman and Arabian historians, &c., and travellers from the middle ages to the present time; the 3rd, external politics and diplomatics; the 4th, Chinese travellers and the question of emigration and Coolie labour; and, 5th, the Chinese colonies and tributary countries. This first part discusses (after the manner of Brunet) the general works, geography (including chartography), ethnography, meteorology, natural history (including zoology, botany, and geology), population, government, jurisprudence, and the commencement of the chronological portion of History,—all referring to the first division. The different subjects are often subdivided for facility of reference.

Subof, —.—Hydrographic operations on the River Amu and its Delta in the year 1874. St. Petersburg: 1878, 8vo., pp. 31, pls.

Entirely in Russian, and forms part 3 of the account of the operations of the Amu-Daria Expedition.

AFRICA.

Elton, J. F.—Travels and Researches among the Lakes and Mountains of Eastern and Central Africa. From the Journals of the late J. F. Elton; edited and completed by H. B. Cotterill. London (Murray): 1879, 8vo., pp. 417, 3 maps, pls., woodcuts.

This posthumous work, edited by the late author's companion at the time of his death, although containing nothing strikingly new to geographers, in consequence of the main features of the various expeditions described in it having been already published by the author and Mr. Cotterill, will nevertheless be of great use to all interested in the east coast of Africa, especially as regards the question of suppression of slave-trade. It abounds in details as to contour and capabilities of the country traversed, and in vivid reproductions of the proclivities and customs of the natives, and the various physical objects observed; whilst the observations on such varied subjects as climate, political relations, and sport, show the ready ability of the author, to whose pencil also are owing the majority of the illustrations, which were drawn on the spot and not from memory. An introductory chapter by Mr. Fredc. Holmwood, Assistant Political Agent at Zanzibar, discusses the African slave-trade in its chief bearings, and, with a preface by the Rev. Horace Waller, materially adds to an appreciation of the work. The first part of the book commences with Mr. Elton's visit to Mozambique in 1873, on his appointment as Assistant Political Agent, and describes his personal experiences on the station, with his journey from Dar-es-Salaam to Kilwa, the main features of which, with his description of the Rufiji, have been published in our 'Journal,' vol. xlv., from which the map is borrowed. It also includes Mr. Elton's return to Natal, and his visits along the coast to Iho, after his appointment as Consul for the Portuguese possessions in East Africa.

The second part describes his journey from Mozambique to the Zambesi and Shiré, his meeting Mr. Cotterill at Ramakukan's kraal, and visit to Nyassa, with details of the return to Ugogo through Merere's country, during which his death occurred. Mr. Cotterill completes the recital; and an appendix by the Rev. A. E. Eaton on the Kungu fly of Nyassa (a member of the Gnat family, forming the chief ingredient in an insect-cake eaten by the natives) concludes the work. The map of Nyassa (of which the east coast is chiefly from observations by Dr. Laws) differs somewhat from that of Young's work, giving more detail, and throwing the whole axis of the lake more to the west. The chief interest, however, naturally lies in the description of the journey from the north of the lake to the time of the author's death, of which a preliminary account has been given by Mr. Cotterill in our 'Proceedings,' vol. xxii. The great range of Konde, at least 12,000 feet high, is considered to be a continuation of the Livingstone

range, flanking the lake on the east; and many important details of the country traversed are well represented on the special map referring to this journey, supplementing the sketch-map given with Mr. Cotterill's account.

AUSTRALIA AND OCEANIA.

Buchner, M.—Reise durch den Stillen Ozean. Breslau (Kern): 1878, 8vo., pp. 470. (*Asher.*)

Counsel, E. A.—Road from Marlborough to Pieman River. Report to Minister of Lands and Works, Hobart Town. Tasmania (Legislative Council): 1878, No. 56, folio, pp. 6.

A river, named Dante, flowing through a lake named Beatrice, rising in the lakes of the West Coast Range and flowing into the King's River, is recorded. It is as large as the North or South Eldon, three miles below the junction of which it was met with. Another river, rising near Mount Reid and flowing into the Henty, is named Nicholas.

Frodsham, T.—Track to Macquarie Harbour. Report to Minister of Lands and Works, Hobart Town. Tasmania (Legislative Council): 1878, No. 55, folio, pp. 5.

In the course of surveys undertaken between the Great Bend of the Gordon River and Macquarie Harbour, a new river stated to be of considerable importance was discovered, west of the Boyes.

Gill, Mrs.—Six Months in Ascension. An Unscientific Account of a Scientific Expedition. London (Murray): 1878, sq. 8vo., pp. 285, map.

Mr. David Gill visited Ascension for the purpose of determining the solar parallax during the opposition of Mars in 1877, and Mrs. Gill's notes during their stay upon the island give an account of its superficial geological phenomena, its scanty flora and fauna, &c.

Lemire, C.—La Colonisation française en Nouvelle-Calédonie et dépendances. Paris (Challamel): 1878, 8vo., pp. 376, maps, plans, pls. (*Barthès & Lowell.*)

The author, who has personally made a complete tour of the chief island, and crossed it in three different directions on telegraphic business, has supplemented his own observations with information of all kinds, political, economic, and scientific, so that his work is practically a monograph. He gives itineraries of the various routes from France, a measured itinerary (with figured indications of the salient features) of his route across the chief island, a general map of New Caledonia, and special plans of the peninsulas of Noumea and Ducos, and of Nou and Pine islands, a photograph of Noumea, ethnological illustrations, &c.

New South Wales.—The Official Post Office Country Directory and Gazetteer of New South Wales for 1878-79. Compiled under authority by James Tingle. Sydney (Sands): 8vo., pp. 665.

Arranged geographically, and containing descriptions of the natural features and resources of the seventy-four country districts of the Colony.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

ASIA.

India Office.—Indian Government Surveys.

Indian Atlas, quarter-sheets:—Sheet 23 N.W. Parts of Bhaunagar, Jetpur, Baroda, Palitana, &c., in Kattywar.—Sheet 34 N.W. Parts of Districts Ajmere and Mhairwara (Merwara), and of Jodpur (Jodhpore), and Udepur (Oodeypore).—Sheet 34 S.W. Parts of District Mhairwara (Merwara), and of Jodpur (Jodhpore), Godwar and Udepur (Oodeypore).—52 S.W. Parts of Gwalior, Jhalawar (Jhallawar), Kilchipur, &c.—72 S.W. Parts of Nagpur and Wurdah (Wardha).—95 N.W. Part of District Kistna.—124 N.W. Parts

of Districts Goalpara, Kamroop (Kamrup), and Durrung (Darrang), in Assam, and part of Bhootan (Butan).—130 N.W. Parts of Districts Durrung (Darrang), Sibsagar, Nowgong, Lakhimpur and Nagar Hills.

Great Trigonometrical Survey of India :—Kumaun and British Garhwal. With Hills. Scale 1 inch to 1 mile. Sheets 30, 31.

Great Trigonometrical Survey of India :—Dehra Dun and the Siwaliks. Scale 4 inches to 1 mile. Sheet 23.

Rajputana Topographical Survey :—Scale 2 miles to 1 inch. Half-Degree Sheet, No. XI., North. Sheets 70, 71, 74, 75.—Half-Degree Sheet, No. XI., South. Sheets 72, 73, 76, 77. Each including parts of Jodhpore, Bickaneer, and Shaikhawati.

North-Eastern Division, Central Provinces, Topographical Survey. Scale 1 mile to 1 inch :—Sheet 33. Portions of Balaghat and Belaspur (Bilaspur).—34. Portion of Balaghat.—36. Portion of Mandla.—41. Portion of Balaghat.—42. Portion of Balaghat.

Central Provinces and Vizagapatam Agency Topographical Survey. Scale 1 mile to 1 inch. New Series :—Sheet 11. Parts of Jeypur (Jaipur), Bindra-Nawagarh, and Bastar.—33. Parts of District Raipur, Kanker, Bastar, and Jeypur (Jaipur).—Sheets 32, 34, 55. Parts of Bastar and Kanker.—36, 38, 56, 57, 58. Part of Bastar.

Ganjam and Orissa Topographical Survey. Scale 1 inch to 1 mile. Old Series :—Sheets 56 and 57. Parts of Kimidy, Bodogodo, and Jeypoor (Jaipur).—76. Parts of Kalahandi, Jeypur (Jaipur), and Kimidi.—79. Parts of District Raipur, and of Bindra-Nawagarh and Khariar.

Assam, 1878 :—To be completed in 9 sheets. Scale 8 miles to 1 inch. Sheet 1, Western Bhutan (Butan). (*Stanford, Agent.*)

ATLASES.

Dalp, J.—Topographischer Atlas der Schweiz. Scale 1:25,000 or 2·9 inches to a geographical mile. 11. Lieferung, Bl. 28: Kaiser-Augst; 30: Liestal; 36: Stilli; 38: Brugg; 75: Niederuzwil; 76: Waldkirch; 79: St. Gallen; 150: Aarau; 151: Rapperswil; 152: Schönenwerd; 153: Gränichen; 215: Kirchberg. Lief. 12. Bl. 7: Therwil; 9: Blauen; 10: Gempfen; 34: Wolfiswyl. J. Dalp, Bern, 1878. (*Dulaui.*)

Vuillemin, A.—Atlas des Bassins des grands fleuves de la France et de l'Europe, d'après les documents les plus autorisés. Nouvelle édition, composée de 12 planches imprimées à trois teintes contenant 32 Bassins et une carte d'ensemble des Bassins de la France. A. Vuillemin. Paris, 1879. (*Dulaui.*)

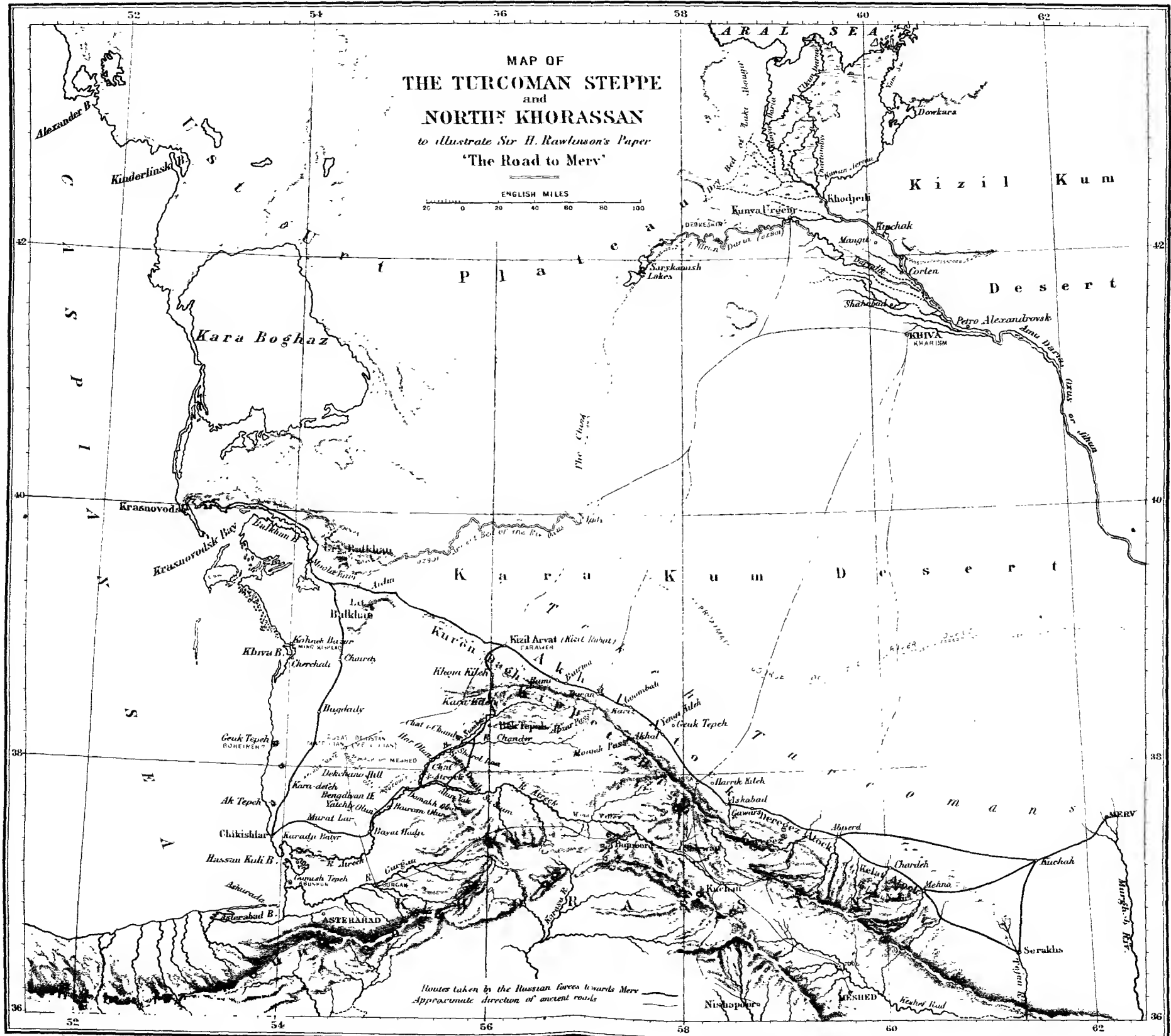
This oro-hydrographic Atlas has received the approbation of the Minister of Public Instruction, and its publication will be continued. The new series will commence with "Le Bassin de la Tamise." The present volume comprises :—

1. Bassins de la Seine et de la Somme; scale 1:1,510,000 or 20·5 geographical miles to an inch.
2. Bassins de la Loire, de la Vilaine, et de la Charente; scale 1:1,850,000 or 25·1 geographical miles to an inch.
3. Bassins de la Garonne et de l'Adour; scale 1:1,450,000 or 19·8 geographical miles to an inch.
4. Bassins du Rhône et de la Saône; scale 1:1,760,000 or 23·5 geographical miles to an inch.
5. Bassins du Rhin, de la Meuse, et de l'Escaut; scale 1:2,351,000 or 31·7 geographical miles to an inch.
6. Carte d'ensemble des Bassins de la France; scale 1:2,360,000 or 31·7 geographical miles to an inch.
7. Bassins de l'Elbe, de l'Oder, et du Weser; scale 1:2,360,000 or 31·7 geographical miles to an inch.
8. Bassins de la Vistule, du Dniéper, de la Duna, du Niémen, et du Dniester; scale 1:4,500,000 or 62·5 geographical miles to an inch.
9. Bassins du Volga, du Don, et de la Dwina; scale 1:6,500,000 or 88·7 geographical miles to an inch.
10. Bassins du Danube; scale 1:4,000,000 or 55·5 geographical miles to an inch.
11. Bassins du Pô et de l'Adige; scale 1:1,290,000 or 17·6 geographical miles to an inch.
12. Bassin de l'Ebre du Franco, du Llobregat, du Ter, et de la Fluvia; scale 1:1,600,000 or 21·7 geographical miles to an inch.

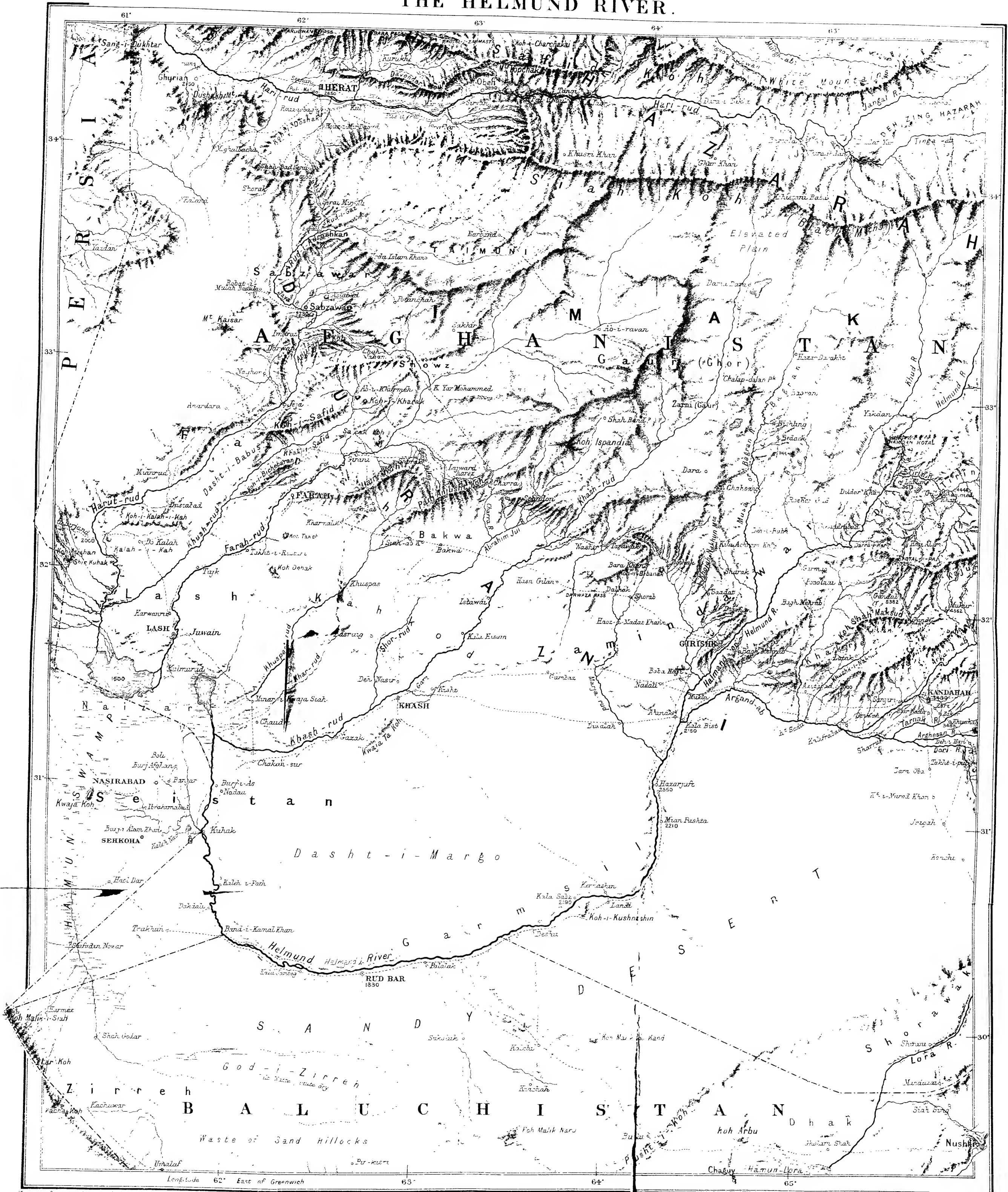


ENGLISH MILES

20 0 20 40 60 80 100



THE HELMUND RIVER.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Explorations Inland from Mount Cameroons, and Journey through
Congo to Makuta.* By the Rev. T. J. COMBER.

(Read at the Evening Meeting, February 10th, 1879.)

Map, p. 288.

THE coast scenery of Western Africa, along the Gulf of Guinea, is extremely tame and uninteresting. After passing the highlands of Sierra Leone and Liberia, all that the eye has to rest upon is low, flat, monotonous country, unvaried by mountain peak, rugged cliff, or anything bold and striking; and as one passes along the Bights of Benin and Biafra, into which fall the rivers Volta, Niger, Calabar, and Cameroons, the sameness and tameness of the prospect become most wearisome. Intersecting the country for miles into the interior are the creeks, lagoons, and marshes, the miasma from which, poisoning the atmosphere, gives to the West Coast its deadly character.

The change from this tame scenery after passing Calabar River and the Rio del Rey is very sudden. The two grand wooded peaks of Cameroons and Fernando Po then loom out of the hazy distance, becoming more and more sharply defined as we approach.

Sailing in the 30-mile channel between the island and the mainland, the attention is fixed on these great mountains, that of Fernando Po rising to a height of over 10,000 feet, and that of Cameroons soaring 3500 feet higher, or nearly 14,000 feet above the level of the sea. Although highly volcanic, and consequently very rugged, the ruggedness of the Cameroons Mountain is not seen as one passes it at a little distance, but with a very gradual slope, varied by small cones and peaks, and covered with most glorious forest, it descends into the sea. This forest appears robed in its best about the month of May, when it has every shade of autumnal tints, and the various hues of green are interspersed with dark

and light brown, deep purple, bright yellow, golden and orange, making it the finest piece of forest scenery I have seen anywhere. The Cameroons Mountain is an isolated mass, as far as at present known of higher elevation than any other mountain in Africa except Kilimanjaro. Its slopes and summit have twenty or more extinct craters. The whole of the mountain up to a height of some 4000 or 5000 feet is clad, as I have described, with thick forest, in which some of the finest timber is to be obtained. At this height the belt of forest ceases, and gives place to open country with swelling grassy hills, beautiful glades and park-like land, and with here and there a broad stream of lava from the craters, and very occasionally a small bit of brushwood or coppice. The natural features of Cameroons Mountain have been so eloquently described by Captain Burton in his book on 'Abeokuta and the Cameroons Mountain,' and who made the first ascent in company with our missionary Mr. Saker, and Mr. Mann the botanist, that it will be unnecessary for me to attempt any detailed description. My duties as a medical missionary in connection with the Baptist Missionary Society, led me to Victoria and the River Cameroons, where we have mission stations, and in April 1877 I made a journey to the peak, being eight days in going and returning. I took note of the numerous extinct craters, and had to cross many broad streams of lava, some of them half a mile in width, and presenting all the characteristics of recent eruption, being free from overgrowth of grass or shrub, and walking over which was like walking over cinders. On the lip of the highest crater I found certain stones arranged in the form of a square, and the neck and shoulders of a bottle, which, I suppose, were the relics of Captain Burton's ascent. The great crater I estimated to be nearly a mile in circumference, but the grass growing everywhere within it showed that it has been long quiescent.

On the summit, where snow is said to be sometimes seen, the effects on the temperature of a highly rarefied and dry atmosphere, combined with a vertical sun, are most striking. Whilst the violent north-east winds made one shiver with cold, the intense heat of the sun's rays burnt my right hand, in which I held my staff, so severely that it was impossible to hold a pen or knife for several days afterwards.

The one objection to the project of a sanatorium at Mann's Spring, situated at an altitude of 7000 feet, for which I believe the mountain was surveyed by Captain Burton, seems to me to be the heavy mists which drench the sides of the mountain. Sleeping in the open air between two fires, my blanket and hair were saturated with this mist; the atmosphere in fact on the slopes of the mountain is extremely damp, and at a height of 2000 feet the locality has not proved healthy to Europeans.

It is not, however, with this grand feature of the country, the volcanic peaks of Cameroons, that I have chiefly to deal in this paper. My object is to describe a journey which I made some distance into the

interior, to the north of Cameroons, a region never before visited by a European, where I was fortunate enough to meet with a small but interesting lake not previously known, and consequently not noticed on our maps.

I started from our little missionary settlement of Victoria, at the foot of the Cameroons Mountain, with the intention of penetrating to some large inland town populous enough to warrant the establishment of a station. The Rev. Quintin W. Thomson, another of our missionaries, had been travelling into the interior for the same purpose, but had only met with unimportant towns, and had been compelled to return.

After a day's journey along the coast in an uncomfortable native canoe, propelled by fourteen paddles, I arrived at a town west of the mountain, called Bibundi, from which we were to start on our journey round the base of the mountain. Bibundi is a Bomboko town, built in two good streets, with well-constructed houses, strong enough to last out two or three generations, and of a quadrangular form built of bamboo sticks and leaf mats. Sometimes, instead of these mats, the skin of the house is made from the bark of trees. The houses are thatched also with mats made from the fronds of palm-trees. The population of Bibundi is about 500, and the men are great fishermen. Their small canoes are often to be seen at 5 or 6 miles distance from the shore.

From the chief of Bibundi we obtained a guide, who with garrulous chatter told us he knew all the country, and could take us as far as we liked to go. Very fortunately, I made this man go over the names in order of every town he knew, and entered them all in my note-book; the last, which he represented as about ten days' journey, and as being a very large populous town, was called Bakundu.

Being somewhat new then to African travel, I was foolish enough to pay this man before starting, and the natural consequence was that, after with difficulty getting him a distance of 20 miles, and being involved by him in many misunderstandings with the natives, we were obliged to get rid of him; and trusting to the correctness of the names he had given us, we steered by compass in a northerly direction, keeping near the western base of the mountain. This plan of ascertaining if possible beforehand, the names of towns to which a guide may propose to take you, is one that may be recommended to other travellers. We found the names and the order of the towns substantially correct, and to be in the northerly direction indicated by our rascally guide. A difficulty frequently arose as to which of several paths we should take, all of which would sometimes lead in about the direction we wished to go; and the natives were often averse to telling us which of these several paths was the one to the town whither we were going; but by a little tact and ingenuity in putting questions, we generally managed to get the information we desired. For many miles in the interior the country at the base of Cameroons Mountain is covered with magnificent

forest, in which are specially to be mentioned the African oak, teak, ebony, and the cotton-tree, or bombax. This last-named appears most conspicuous and remarkable, with its huge spreading trunk, the lower part being deeply fluted with four or five far-projecting arms, and the tree reaching to a height of 100 feet or more. This forest is most luxuriant, and affords a grand field to the botanist. The pathway through it is very rough, and seldom traversed by the natives; lava-cinders, large and rough, lie everywhere, and make walking difficult; spreading roots of trees, from which the soil has been washed away by the heavy rains, leaving them exposed on the surface, have to be tripped over carefully; trunks of large trees, thrown down by fierce tornados, lie across the path, and have to be clambered over; and creepers and tough bush-ropes hang from the trees and festoon across the path. All this makes the road very toilsome. But the most wearisome part of travelling in this country is crossing the small rivers, having first to descend deep precipitous ravines, and to haul oneself up the opposite bank by the help of the overhanging branches of trees. In our first day's journey of 12 miles, we had eight such streams to cross. These gorges and gullies are full of water in the rainy season, making the road almost impassable. In these ravines, in the dry season, the water runs musically along, forming pretty cascades and cataracts; and the crossing is generally effected at the ledge of one of these falls, where there are frequently large projecting boulders of rock. The rivers all trend in a westerly direction, some of them running direct into the sea, and others helping to form the Rio del Rey.

After going some 40 miles towards the interior, the forest abruptly ended, and was succeeded by extensive grassy plains dotted with fan palms. These plains were sometimes 4 or 5 miles across and formed a beautiful feature in the landscape. The soil here was clayey and of a ferruginous appearance. These plains are larger and more frequent as one goes west, but cease altogether on the mountain slopes, where a dense forest accompanies the volcanic soil.

From Bibundi to Bomano is a gradual ascent, until at the latter place we are about 1500 feet, and at Mongongge 1800 feet above the sea-level. From Bomano there is a road to Mann's Spring, 7000 feet up on the mountain side, which road is only used by hunters, who seek the few antelopes that are to be found on the beautiful mountain plains. Game is very scarce, and the hunters are very timid as a rule; but there is a good deal of playing at hunting. Most of the men carry flint-lock muskets, and have an utterly delusive idea that they are bold and skilful hunters. If, after being absent in a large party for several days, they return with any meat, it is a cause of great rejoicing and surprise. An antelope or porcupine, a monkey or wild hog are sometimes shot, but from the scarcity of these animals may be inferred the general rarity of the larger game. One of our carriers saw on this journey a leopard

spring from the fork of a tree and disappear, and we noticed leopards' teeth worn as ornaments or charms by the natives, but these animals are rare. The elephant country, which we traversed afterwards, lies further on, behind the mountain. Monkeys, especially the baboon and the cynocephalus, the *Suti*, and the small green monkey were plentiful; the common grey parrot, green pigeons, ringdoves, as well as many strange birds of beautiful plumage were frequently seen. The domestic animals are a few cattle, goats in abundance, pigs and fowls; but the people will seldom sell anything but fowls, unless it is their scraggy dogs, which they sometimes offer to sell you for food. Sometimes twenty or more goats will be seen tethered on a ledge outside a large Bomboko house, some of them magnificent rams with long venerable beards. At night these animals are secured to stakes inside the house, and one house in which I slept at Bibundi, accommodated twelve goats, eight dogs, and fowls uncounted, besides its twenty human tenants. The stench arising from this bed and sitting room, with the doors closed at night, was horrible, and as may be imagined, the place swarmed with mosquitoes, making it utterly impossible to sleep.

Vegetable food among the Bomboko people is cheap and plentiful, the country being extremely rich and fertile. A bunch of plantains enough to breakfast six or eight men, can sometimes be purchased for a leaf of tobacco. Plantain and yam grow finer around the foot of Mount Cameroons than I have seen them anywhere else. In some places on the mountain side, we found it very difficult to obtain water. Between Mweali and Booba, for instance, the people have no regular supply, and when they have no rain, they bend down the large broad leaves of the plantain to catch the dew, and wring out the moisture from the succulent stem of that valuable plant.

The rainy season here begins about the end of May, and is at its height in August. It is ushered in and makes its exit with fierce tornados. The dry season may generally be expected early in November.

Four days' march from the coast brought us to Kuki, near Monyangge, the furthest point reached by the Rev. Q. W. Thomson. Keeping nearer the mountain slopes than he did, we came to Mweali, the first town previously unvisited by a white man. The people at Mweali were very friendly and hospitable, and Neekau, their chief, expressed his joy at being visited by a white man, which he felt to be a great honour, told us we must stop in his town three days, and clutching an unfortunate fowl which happened to be near, he immediately himself killed it, together with a duck, and gave them to his women to cook for us. We found Neekau an interesting and lively old man, his face always puckered into a smile; but his habit of frequently grinding his teeth, accompanied by a very unpleasant noise, we felt rather as a nuisance. This habit seems to be a royal prerogative in this part of Africa. The people gratified their curiosity almost to the full by gazing upon us with eager

interest and astonishment, scarcely allowing us to go to bed unwatched. They had a way of seeming to shade their eyes to look at me, lifting the hand to the head in a sort of military salute. When they meet one another they salute by touching palms, but do not shake hands. We saw one woman blacked all over with charcoal, which we understood was a sign of mourning. In the Cameroons River, the people generally shave their heads as a sign of mourning. The people at Mweali treated us to a dance, which consisted of going round in a circle, some drumming, others using cymbals, and all chanting an unmusical snatch of song; and the special point with them all seemed to be as to who could shake the muscles of chest, back, and arms most vigorously. It is a sort of prolonged intensified shudder.

The people here, as at most places, raised objections to our going further, but they did not proceed to stop us by force. They were generally willing that we should stay and build in their town, but did not like the idea of their neighbours getting the preference. Sometimes they seemed to mistrust us, and refused to sell us food, and once would not let us know where their water supply came from. In one town, where we arrived late in the afternoon and wished to sleep, the people refused to allow us to do so, and we had to go outside the town; and on another occasion the conduct and bearing of the people seemed so suspicious that I thought it prudent to set a watch all night, although I now think my suspicions of unfair play were unfounded. As a rule, people who had never before seen a European face were afraid of us, sometimes running away into the forest, and leaving everything in the town at our mercy, and sometimes shutting and barring themselves in their houses. The dress of most of these people was the simple ordinary waistcloth, generally obtained from trade with the coast and from Calabar River, across the Rio del Rey. In some cases the only dress worn was a fringe of leaves before and a tassel behind. Women never covered the upper part of their person. In the Loangasi country, direct east of Cameroons River, and not more than 100 miles from where some thirty European traders are stationed, we found the men entirely naked, and the women not nearly sufficiently clothed to come up to ordinary African ideas of decency.

On the sixth day from the coast we came to the border of the Bomboko country, of which Boöba is the northernmost town; and having crossed this border, we felt we had pierced the belt of the country, and were in the interior. A new language, unintelligible to our carriers and interpreter, as to ourselves, here prevailed, and we had to adopt a system of treble interpretation, fortunately finding in the new district a few men who knew the Bomboko tongue. This new country is called Bakundu, and has two large towns of that name. For the most part it is densely wooded and plentifully supplied with water. The watershed of the two small river systems of Mungo-Cameroons and the Rio del

Rey is here found, the overflow of the small lake going into the Mungo, and the country west of the lake draining into the Rio del Rey. We had no means of ascertaining the height of this watershed, but should judge it to be about 1000 feet. Bakundu is situated in what may be generally described as a broad valley, between the Cameroons Mountain and the Rumby Hills to the north-west. This valley is about 40 miles broad, and very beautiful and fertile. It is well peopled, having many large towns containing from 1000 to 2000 inhabitants. The natives trade principally in palm oil, of which they make large quantities, most of it going to Calabar through the network of creeks connecting that river with the Rio del Rey. Indeed, palm oil seems to be the only article of trade they traffic in; for although indiarubber grows on the slopes of the Cameroons Mountain, the people do not yet know its value. I have seen also coffee and cotton growing wild in this valley, but it is not cultivated. Elephants exist in great numbers to the east, towards the Mungo River, but the natives are not bold and enterprising enough to hunt them, and very little ivory is obtained from this district.

Failing to reach Bakundu by dark, after a weary march of ten hours, we came to such a torrent as I have described, situated in the heart of the forest. Fearing to cross it in the dark, we camped on the south bank, and not having a travelling tent, spread our mackintosh sheets on the ground, and lighted three or four fires to scare off any stray leopard; and in the early morning entered the town of Bakundu-ba-Misaka (Misaka being the chief's name).

Bakundu-ba-Misaka is a large town (the first large town we reached) in the form of one street, stretching more than a quarter of a mile long. Half of it is on the slope of a hill forming one side of a valley, and the steep descent of about 30° or more to the horizon reminded one very much of some North Devon towns, or of some parts of Funchal, in Madeira. The slope is of soft and hard shale, in alternate strata, and when wet with rain is very difficult walking. The lower part of Bakundu is level, lying at the bottom of the valley, and at this lower end of the town runs the river supplying the inhabitants with water. The houses are very large, and are neatly and strongly made, being of a quadrangular shape and thatched with grass, forming a continuous row on each side of the street. They are sometimes 25 feet to 30 feet long, rising up to 10 or 12 feet at the ridge pole, and as many as a hundred people can crowd into one of these large houses.

The population of Bakundu-ba-Misaka must be about 1500. There are two sections of the town, each of which has its "Sanga-mboka," or headmen. The larger of the two is a split from Namwidi's town, to the south-east, the other being composed of Bayi people, the original possessors of the place. The distinctly Bakundu section is the more influential of the two parties. They are a very simple and peaceable people, and when we first entered their town were very timid and apprehensive;

but a young trader from Akumbi, who had been to Calabar and knew a little English, removed their fears by coming up to shake hands with us, and after a time we became on very good terms. None of them had ever seen a white man before, and it was nearly a day before the principal chief would show himself.

After a day's rest at Misaka's Bakundu, we went on eastwards, much against the wish of the people; and in three or four days—the path lying through thick forest, and covered everywhere with elephants' tracks, trees which they had uprooted, and sloughs where they had wallowed; and seeing, too, canoe tracks leading in several directions—we came to the lake in which Balombi-ba-Kotta Island is situated. At first we thought we had lighted on a broad river, as we looked across almost a quarter of a mile of water, and saw a town on the opposite shore.

Some women coming from their farms (which are cultivated round the lake) were considerably astonished and frightened at seeing us, and dropping their heavy loads of firewood and plantain, rushed down the hill to their canoes, and calling out wildly to the people of the town opposite, paddled off swiftly to the island. Soon about 100 people had come across in little rickety flat-bottomed canoes, and the men approached fearlessly, although they had never before seen a white man, and pressed us to come across to their island.

I could not persuade one of my men to go across with me, as they were suspicious of the people, and much averse to leaving "terra firma"; and being more anxious to get an observation of the mountain peak, which I had not seen for several days, and promising myself a second and early visit to the lake, we went on past Balombi-ba-Kotta. Losing our way completely in the forest, and failing to get a view of the peak, we were obliged to retrace our steps, and returned by the same road we had come to Bakundu, and thence to the coast at Bibundi, which we reached in five days and a half.

My next visit to the lake was after the rains had ceased, in November of the same year, 1877. Starting from the opposite or eastern side of the mountain, and going up a branch of the Cameroons River called the Mungo, I succeeded in getting right round the mountain in a journey of twenty-one days, and this time made myself better acquainted with this new lake.

The Mungo River, a northern branch of the Cameroons, is a considerable stream, and is navigable for over 60 miles. Its greatest breadth is at Mbunjo, the second large town, where it is about 250 yards broad. The rise of the Mungo River during the rains is very great, probably 14 or 16 feet. I myself marked a rise of nearly 3 feet after a heavy night's rain, and we often saw the water-line on the trees growing from the banks, more than 6 feet above the surface of the water. In the rainy season it runs from 3 to 4 knots an hour; and with a long gig,

pulling eight oars and six paddles, I was four days getting to Malendi, 40 miles from the mouth.

The Mungo empties itself by some four openings into the Cameroons River, and the country all about its estuary is intersected with creeks in every direction. In the upper part of the river many large and interesting towns are to be found, after ascending the steep banks, rising sometimes 100 feet above the level of the water; and from one of these towns, Malendi, we sent our boat back to Cameroons, and prepared for our land journey round the mountain. The rainy season was not quite at an end, and we were delayed at Malendi for two days in consequence of the swollen condition of the small rivers we had to cross. When at last we did start, we had to swim many streams, and splash through miles of mud and slush in the forest.

In three days from Malendi, after wearisome marches through thick forest, we came again to Balombi-ba-Kotta Lake, having passed through several good-sized towns—among them Bakundu-ba-Namwidi, about the same size, and built in the same style as Misaka's Bakundu. All the water we crossed appeared to run into the Mungo River, into which also flows the water from the lake.

Since my previous journey, the Rev. Q. W. Thomson, as already mentioned, had visited the lake, making the second European the people had seen. Mr. Thomson had been across to the island, but had not, I understood, 'circumnavigated' the lake. On this, my second visit, I embarked with my party and was paddled across, and found the island to consist of igneous rock, with very little soil. The people grew nothing in their town, but had their farms on the shores of the lake. The population would be from 300 to 400, and the people very simple and hospitably inclined. As a sample of their kindly hospitality, I may mention that we were always invited to several houses to breakfast or dinner; and wishing to cultivate the friendship of these people, we would accept every such invitation, and tasting a little of every man's hospitality, we left at each place huge bowls of savoury fish and plantain, cooked with palm oil, for our men to finish.

While enjoying the hospitality of these islanders, I obtained a canoe, and spent a morning in going round the lake. It is about 6 miles in circumference, of an oval shape, having its greatest length north and south. It is plentifully supplied with fish, and contains many turtle, whose shells we saw in the town. A waterfall coming down a steep bank to the south-east feeds the lake, and it has its outlet in the N.N.E. corner. We drifted with the current a little way along this effluent, but it was so blocked up with fallen trees that only the small canoes can go down it. The people told us that it led to a place called Memi, and on into the Mungo River.

The lake is situated in a deep depression, and has steep wooded banks all round it. From careful dead reckoning, and having visited it

twice, approaching it from opposite points, I set down its position as about lat. $4^{\circ} 45'$ and long. $9^{\circ} 18'$. The name Balombi-ba-Kotta is that of the town on the island. The lake itself has not any special name that I could ascertain. If the discovery of it entitles me to give it a name, I would wish to call it after one of my oldest and best friends—Lake Rickards.

Leaving the lake, and going again to Misaka's Bakundu, we went by a route varying a little from our former one, to the coast on the western or opposite side of the mountain to that from which we had started, reaching the sea at a town called Sangi. Thus I have given you a rough description of the inland side of Cameroons Mountain.

The country east of that which I have visited is the least known of any part of Africa, and is a perfect blank in our most recent maps. From the Upper Congo to the Mahommedan States of the Soudan, and west from Schweinfurth's Niam-Niam district to the coast, is (save the country I and my colleagues have visited) entirely unexplored. It would have been an interesting occupation to me to have continued my explorations in this unknown region, but I had another and more important part of Africa to occupy my attention—the Congo, or Livingstone River.

I may say that, having made other journeys up the various branches of Cameroons River, I might give you much interesting information about them; but my late colleague, Mr. Grenfell, of Victoria, having explored the river more exhaustively than I have, I leave it to him to give you at some future time the results of his investigations.

*Journey through Congo to Makuta.**—It remains for me to give a short description of a journey I have recently made in company with Mr. Grenfell to the interior of Congo, a region of which the Portuguese and Italians in time past have given such utterly untrue accounts.

Missionaries have done, and are doing, almost as much for the geography of Africa as ordinary explorers. There is no name more honoured and revered in this Society than that of David Livingstone. Dr. Moffat's fifty years of interior work were not without geographical results; and there are few interested in the geography of Africa who are not watching with special interest the three Lake Missions—to Victoria Nyanza, the Tanganyika, and the Nyassa. The Baptist Missionary Society has chosen the great River Livingstone, or Congo, and their present efforts are to reach Stanley Pool, above the falls of the lower river, whence there is more than 1000 miles of navigable waterway, and on which they hope soon to launch a small steamer.

To select a suitable base for a mission, Mr. Grenfell and I were sent in June last, with special instructions to visit San Salvador, the capital of Congo, occupied some years ago by the Portuguese, and to

* See Lieut. Grandy's map, 'Journal R. G. S.,' vol. xli. (1876) p. 428.—[Ed.]

make friendly overtures to the King of Congo. Arriving at the mouth of the river, and being kindly received by the Dutch, we started off in our own boat (an eight-oared gig), in which we sailed up the river for 120 miles, to Mussuca, above Boma. Here, leaving our boat, we started off with about thirty carriers to San Salvador, which we reached in eight travelling days, and found to be nearly 100 miles from the river. It will be remembered that Lieutenant Grandy visited this town, when he was commissioned by this Society to command the "Livingstone Search Expedition" from the West Coast. As Grandy has described * very correctly the country of Congo, I will not enter into the details of our journey, contenting myself with a description of Makuta, into which Grandy was not allowed to enter, and from the neighbourhood of which place he retreated to San Salvador, and thence to the lower river. The presents which he had sent to the King of Makuta were returned, the king saying he wanted to have nothing to do with white men. This was about six years ago; and, fearing a like repulse, when we approached Makuta we sent an ambassador with a good present to the king, who, to our great satisfaction, said we might visit him, but was curious to know what we really wanted. His words to our messengers were: "What do the white men want, every day, coming to my country? Let them come and see me." Now, the only white men who had been near him were Grandy and Stanley, and of the latter he had only heard, from, I suppose, his neighbours, the Babwende. In two days from Banza Umputa we arrived at Tungwa, the largest Makuta town; and it was with no ordinary feelings of pleasure that we looked down from the brow of a hill into the largest and prettiest town we had yet seen in the district—in fact, the neatest and prettiest town I had seen in Africa. An irregular cluster of some 200 houses, some of them but half revealed amongst the beautiful foliage of some trimly kept trees—planted by the people themselves as ornaments to their town—lay in the valley at our feet. This was Tungwa. I had never before seen a designedly pretty town in Africa, and was scarcely prepared for so much real taste and neatness. The streets and squares were well kept, and are probably frequently swept. Regular groves and fences of a tree, bearing a pretty purple and white flower, divided off the town, and a pretty river of delicious water—a branch of the Quiloa—winds round the east and south of the town. Now, no European had before entered Tungwa. Grandy, with his expedition, had stood upon this hill, after travelling 300 miles from the coast. He had seen the pretty sight we saw, but beyond the brow of the hill he was not permitted to go, and he had to return, the King of Makuta not allowing him to enter any Makuta town. And so it was with exultant feelings that, surrounded by some hundred people who had come up the hill to meet us, and listening to the welcoming drums of the town below, we saw our carriers donning their best bit of cloth and

* 'Proceedings R. G. S.,' vol. xix, p. 78.

finery, and our own Cameroons boys putting on clean shirts, preparing to make a striking entrance into the town.

As we strode down the hill and crossed the river, which is about 20 feet wide, and from 2 to 6 feet deep, more of the inhabitants gathered about us, curious and fearless, but not impertinent; and we followed our good guide and interpreter Matoka into the centre of the town, and found that the people were in a great state of excited curiosity. Some hundreds formed a half-circle at the front of the house, under the eaves of which we sat, and they were eagerly pressing upon one another, and gazing at us with that intense wondering gaze which I had before encountered at interior Cameroons. It was interesting and pleasant too to see the frequent family resemblance between one and another, a thing I had not noticed before in Africa, except among a few Cameroons families. But most interesting were the children. Some half-a-dozen boys, about eight to twelve years of age, with frank open faces, bright lustrous eyes, and well-formed heads, I became quite attached to. We found these boys to be very quick and intelligent when we tried to teach them.

The King of Makuta gave us a grand reception, with much dinning of music. Amongst other musical instruments were seven ivory horns, each formed of a single tusk. The people of Makuta are great traders and very enterprising, and the king seems far richer than his neighbour, the King of Congo. Makuta and Zombo are the two great ivory marts of the south of the Lower Livingstone; and frequently do the Makuta traders go down to Ambriz—a journey of twenty days—in parties of 100 strong—to sell the ivory which they buy from the Mpumbu and Babwende people.

We stayed at Tungwa of Makuta four days, having sent our previous set of carriers back, and hoping that the King of Makuta would give us carriers to take us on to the river. This, however, he would not do, as the responsibility would have been too great; but he said that if we brought our own carriers he would allow us to pass.

We were anxious if possible to make Makuta the interior base of our mission, but the people were afraid to allow us to live amongst them, although as visitors they treated us very kindly. Frequent interviews with the Soba or King failed to gain the object we had at heart; drought, famine, pestilence, or death were feared as the consequence of a white man's residence in the country; and we were told that if any calamity befell the neighbouring tribes it would be put down to our account, and there would be war. We were at last definitely told to go away, although as courteously as such an order could be given. The people were simply afraid of us, and this timidity can only wear off by our constantly visiting them.

We could not ascertain the population of the whole district of Makuta, but that of the one town (Tungwa) is about 2000—greater than

the population of San Salvador. The people speak the same language as at San Salvador—the Fiyot; and the two tribes are on friendly terms, Totola of Congo being the more influential of the two chiefs, although the Soba of Tungwa is the richer.

Food at Makuta was plentiful and cheap, yams, plantains, cabbages, and onions being easily bought. Knives were much sought after in exchange for fowls; and for a knife costing sixpence (all expenses paid) we could always buy a good fowl. The people have some large but lean sheep, goats and pigs, but no oxen. The town seems healthy, and is reached by the sea-breeze, which blows right across the highlands from the coast, nearly 300 miles away.

From San Salvador to Makuta the road may be described as very good for West Africa, and one of our early efforts on our return will be to survey the road from San Salvador to the coast. Those terrible falls of the Lower Livingstone have ever kept us from knowing the upper river, and prevented the commercial development of the interior. Once get a line of railway to Stanley Pool, and nearly the whole course of the Livingstone, almost as far as Nyangwe, is open to us. Our object, however, is at present to have a chain of some two or three stations to Stanley Pool, and then to carry a steamer in sections across the rough quartzose hills of Congo, and place it on the upper river. In doing this, we feel we shall not only be helping to carry out our higher objects as Christian missionaries, but shall be advancing also the objects of the Royal Geographical Society.

The following discussion took place after the reading of the Paper:—

Captain BURTON said his first duty was personally to thank Mr. Comber for having found his bottle. He believed it was empty when found. All that he put in it was the names of his companions; and its being broken would seem to show that the natives had been to the summit since his visit. When he was up the mountain they were afraid to do so lest they should meet evil spirits; but he fancied they must now be much more civilised. Mr. Comber had made a most interesting journey, and brought back a considerable amount of new information. The lake described was previously unknown. He would avail himself of the opportunity to ask Mr. Comber a few questions. In the first place it would be interesting to know whether *Bakundu* was the name of a tribe or only of a town. It appeared rather strange that two large settlements, near together, should bear the same name. Again, when he was on the mountain he could distinctly see to the north a range of distant hills, which were supposed to be connected with a very mysterious inland chain, of which Barth had heard, but nothing had since been ascertained regarding them. It would be important to know if Cameroons was simply an isolated mass rising from the coast, or formed part of a chain, stretching towards the interior, and separated by the lowlands travelled over by Mr. Comber. Throughout Africa game is exceedingly rare in the thickly wooded countries. Animals cannot live in the eternal shade, especially where the ground is perpetually damp, and the sun's warmth does not penetrate to it through the dense foliage. The large animals usually live in open plains, whether surrounded by forests or not, where they get the sun. As regards drinking the juice of the plantain, he had

often been reduced to it, and uncommonly good drink it was. He might perhaps be permitted to revive some reminiscences which were now almost forgotten. Some years ago when garotters were troublesome in England, he offered to take charge of 1000 of those who had thus misconducted themselves, and place them 4000 feet above the sea-level in the Cameroons district. Low altitudes in such regions are dangerous to health. The malaria seems to reach a certain height, up the mountain slopes, but beyond that the climate is healthy. The same might be said of the Peak of Fernando Po, which he also ascended, and found a splendid open tract of country clothed with grass, European vegetation, *Cytisus*, and other familiar flowers. The late Major Levieson also advocated his plan with regard to convicts, but it was decided by the authorities to consume their own crime at home, and apparently they had since had a good deal of it to consume. He could not help considering the Cameroons Mount, as that mentioned in the 'Periplus' of Hanno, in which ancient work fire issuing from the ground was mentioned. It had been supposed by some that that passage referred to burning grass, but the description distinctly pointed to volcanic eruption. Usually the 'Periplus' of Hanno was supposed to have ceased about Arguin (?) Island, but in ancient manuscripts anything like numerals was subject to much corruption, and if Hanno had set out prepared to circumnavigate Africa, there would have been no difficulty in reaching 4° N. Mr. Comber had spoken of snow on the Cameroons. Whenever rain fell in the low regions there was snow on the Cameroons, and he himself had once slept in the snow there at a spot from which he could look down on the Equator. He also wished to ask Mr. Comber if he had ever heard of an eruption from the Peak of Cameroons. When he inspected the crater he saw signs of recent action. He carefully observed them, and made sketches. Shortly afterwards he heard from Fernando Po that fire had been noticed rising from the crater. He had written a letter to Mr. Frank Wilson, who was with him at Fernando Po, and the answer he had received was:—"I am sorry that I am unable, as yet at least, to give you any further information about the Cameroons eruption. I was absent from Fernando Po (probably on a tour round the factories) when it took place, and when I returned I remember that it was the one great subject of interest and of conversation. In writing to you at the time I could not fail to report an event so important and so interesting, and I cannot have had the slightest reason for thinking that those who informed me of it could have mistaken the nature of the phenomenon, or I would not have described it as a real occurrence, but as a story merely. I employed myself yesterday in looking through a mass of old diaries, note-books, and letters, in the hope of finding some reference to it, but without success so far. I shall continue the search. I find that I wrote to you at Santos, in April and June, 1865."

With regard to Mr. Comber's journey to the Congo, his account was exceedingly interesting, especially in connection with the proposed ulterior proceedings by missionary bodies. All present must be aware how much missionaries had done for Africa, but Cetewayo, with whom England was now at war, used to say, "First a missionary, then a consul, and then come army." Mr. Comber was fortunate in going at a time when the natives on the Congo River had considerably changed their manners. Ten years ago, when he himself was there, and six years ago, when Lieut. Grandy was there, travelling was literally impossible. If the explorer had rum, the natives would never start until they had drunk it all, and then they were not in a condition to start; while if there was no rum they would not move at all. He wished Mr. Comber to remember one thing about the climate of the Congo. Nothing could be more beautiful than the district below the Falls, nothing more picturesque and charming; while nothing could be more removed from anything like extremes than the climate; at the same time Europeans could not live there.

The Portuguese, who established missions there on so large a scale in the seventeenth century, all died out. He had found their church bells and parts of Gregorian chants under the jungle trees. Europeans did not understand the peculiarity of the climate. At Boma he tasted peas, cabbages, and potatoes which were grown there, and there was no difference in the taste of those vegetables. The climate might possibly have the same effect on the human frame.

Mr. COMBER, in answer to Captain Burton's questions, said, in his ascent of Mount Cameroons, he found traces of a recent eruption. He had to walk over two or three lava streams, upon which there were no grass or shrubs, and he imagined that they must have been caused by the eruption which the people in the neighbourhood spoke of as having occurred some six or seven years ago. One of his objects in going to the peak was to try and get a view of the northern part of the country, interior to the mountain; but the time at which he travelled was unfavourable for the purpose, and he was not able to see the range of hills beyond, of which Captain Burton had spoken, but between the Cameroons and the Rumby Hills there certainly was a broad valley, making the Cameroons Mount an isolated mass. As to the name Bakundu, he could not definitely ascertain whether it was applied to the whole district, or simply to two towns. The western town was a split from the eastern one. The two were formerly one, but both at Bakundu Namwidi, and on the island in the lake, the people said they spoke the Bakundu language. The name might therefore be also applied to the district. With regard to the climate of the Congo, perhaps the river had altered in some respects since Captain Burton was there, for at Banana, at the mouth, there were 60 or 70 Europeans, and at Boma, 20, and at both places it was a rare thing to find a European laid aside by sickness.

Mr. EDWARD HUTCHINSON, referring to the statement in the paper, that an attempt to form a sanatorium any distance up the Cameroons Mount, would not be successful on account of the heavy mist, said, perhaps Mr. Comber was aware of what Mr. George Thompson had done there, and that the Church Missionary Society hoped to establish a sanatorium on the mountain. The society had been led to consider the project by the necessities of the Nigr Mission, and the pleasant account given by Captain Burton, who strongly advised such an establishment. Two men had been sent out to make the attempt. Mr. George Thompson, who, he believed, was a brother of one of the missionaries of the Baptist Society, was cultivating land there, and looked with delight to the formation of a sanatorium; but if Mr. Comber considered the scheme impracticable, the Church Missionary Society would of course be rather disinclined to make the attempt.

Sir RUTHERFORD ALCOCK, in reference to Mr. Hutchinson's remarks, drew attention to the statement in the Paper that at a certain elevation it was exceedingly unhealthy, and equally so lower down. That, he said, entirely corresponded with some experience recorded a great many years ago in Jamaica. A barrack was formed there at the foot of some hills, and the effect upon the troops was so disastrous that immediate steps were taken to quarter them at a great elevation. But the new position was found to be equally unhealthy. Ultimately it was discovered that the malarious influences swept in strata. The lower strata were pestilential, and there were also upper strata of the same character, but the middle strata were perfectly healthy, and when the barracks were placed there the troops escaped the fever. He therefore hoped that before any sanatorium was made on the Cameroons careful experiments would be made in order to decide with some sort of certainty at what level the best sanitary results would be obtained. It did not follow, that because at the foot of a mountain or at a certain distance up it the air was pestilential, therefore there was no part that was perfectly healthy. The Meeting was much indebted to Mr. Comber for his paper, which afforded a good deal of encouragement in many

respects. Mr. Stanley had given such a very discouraging account of the reception he met with from the natives along the Congo, that he must be a very brave man indeed who would undertake to lead another expedition in the same direction. Mr. Comber, however, found nothing but kindness and hospitality in the Makuta district, which was close to the course of the Congo above the Falls. Some little suspicion and fear were quite natural in the natives. White faces did not always bring peace and good-will towards men in their track, and what Cetewayo was reported to have said was perhaps not altogether untrue—that the missionary very often preceded the consul, and the consul an army; but it was very satisfactory to find that there was a large district, a fertile populous valley, of considerable extent, where the people were fairly well disposed to receive white men, and willing to believe that they might bring benefits rather than difficulties and dissensions after them. That was the moral to be drawn from Mr. Comber's paper. Conclusions must not be drawn from the experience of merely one set of travellers, for it was evident that there were some of the natives leading peaceful, agricultural lives, who were ready to receive Christian missionaries, and profit by other civilising influences.

Captain BURTON said, in reference to Mr. Hutchinson's remarks as to the advisability of establishing a sanatorium on the Cameroons Mount, when he was sent to Fernando Po, a place celebrated for its consumption of Consuls, the only means by which he could keep himself alive was to live a certain distance up the mountain. He followed the old adage, "*Fiat experimentum in corpore vili.*" He went himself to discover a spot, and he found that he could live with the greatest possible comfort at 2000 feet above the sea-level. Of course there was no such thing as absolute altitude for health. The choice must be made according to the different influences of wind and weather, &c. In the Nilgherry Hills a sanatorium was at first formed below Connoor, but fever was found to prevail there. From Fernando Po he was sent to Santos, where Consuls were consumed still more rapidly. Six died or were disabled within six years, but he prevented such disaster in his own case by living at São Paulo, 2200 feet above the sea, where yellow fever and cholera never reached. He thought the Church Missionary Society would be quite justified in trying the experiment of establishing a sanatorium on the Cameroons Mount.

The PRESIDENT, in moving a vote of thanks to Mr. Comber for his interesting paper, said he entirely concurred with Sir Rutherford Alcock's view of the lesson to be derived from it. Nothing could be more hopeful or satisfactory than the almost idyllic picture which had been drawn by Mr. Comber's able pen, of a country which he trusted was destined to become the theatre of his successful labours.

On the Bamangwato Country. By Captain R. R. PATTERSON.*

(Read at the Evening Meeting, February 10th, 1879.)

Map, p. 288.

THE Bamangwato territory is now ruled over by the Chief Khame. Its soil is sand, covered for the most part with stunted bush. There are few mountain fastnesses, with the exception of those in the immediate neighbourhood of Shoshong. In the winter season it is badly watered. Of the rivers, only the Limpopo, Zambesi, and Zougá or lake river run continuously. The Tati, Shasha, and Makalapogo are sand rivers, in

* Communicated by the Colonial Office. The substance of a Report made by the late Captain Patterson to Sir Theophilus Shepstone.

which water can always be obtained by digging. All of them are cattle posts. There are many small rivers in the interior, which contain pools, and where water can be procured by digging.

The open country is sparsely inhabited by "Veld" people of two classes, the Bakala and Masarwa. The former enjoy the right to possess cattle and gardens; the latter neither. They are slaves, living on game and roots. Under the present chief, Khame, their condition is much improved; he does not permit them to be sold. They are obtaining guns, indeed, and becoming somewhat troublesome to their masters.

Shoshong, the capital town, is badly watered by a small source becoming a sand river in the Kloof. There are far preferable sites for a town, but this was chosen for reasons of strategy, the hills on three of its sides being steep, rugged, and easy of defence. The number of inhabitants is estimated at 10,000, of whom 2500 are fighting men, divided into five regiments, commanded by the Chief's brothers. A fair proportion of the men and some of the women are adopting European costume; the remainder are clothed in the skins of wild animals. They do not drink spirituous liquors, and but few smoke. Their means of living are almost entirely derived from the chase. The women cultivate gardens in the plain. Some advance may be said to have been made in agriculture, as they have in use about forty imported ploughs.

Their herds are not large, as they suffer from the constant depredations of their more warlike neighbours, the Matabeli. The estimated number of their oxen is from 7000 to 8000; of sheep and goats they own considerable flocks. Every man in the town has at least one pack-ox, one cow, and a few sheep and goats. Horse and cattle sickness are prevalent; red water is unknown. The people do not suffer from other than the usual epidemics, and are in part vaccinated. Some years ago the population amounted to 30,000. The town then extended far into the plain. The great decrease is ascribed not so much to death as to constant political changes, and fear of their neighbours. The Bamangwato are not warlike; and being a branch of the great Bechuana race, speaking a common tongue, the Sechuana, can easily find new homes when induced to do so by fear, or as followers of some deposed chief.

Several villages are in the neighbourhood of Shoshong; and a town, Bamaerwapong, especially belonging to Khame, lies about three days by the waggon north-east of it, well watered, with good land for cultivation.

Baseleca, another town amongst the mountains, one day east of Bamaerwapong, was formed by refugees. Setchome, the late chief, having granted the site, the inhabitants pay no tribute, and govern themselves. The white inhabitants, traders and their families, have a settlement of nine stores with other buildings somewhat advanced on the plain. They number twenty-three adult males, six adult females, and thirteen children.

Khame, Chief of the Bamangwato, is about forty years of age, tall,
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active, earnest, and quiet in manner, brave, gentlemanly in bearing, said to be a sincere Christian, anxious to elevate his people, and realising that the best means of doing so is by a more intimate connection with the English people. He has one wife and four children; the eldest boy is about ten years of age. His history is chequered. The eldest son of Setchome, he came early under the teaching of the missionaries, seconding that of his mother, who was a remarkable woman, not professing Christianity, but having enlightened views as to progress, social life, and its duties.

All bear witness to the just manner in which Khame rules, to his great consideration for his people, to his fearless administration of justice irrespective of colour: perhaps two examples may illustrate this better than any expression of my own.

1. Some time back the white traders then resident here, lived riotous lives, gambling and drinking to excess, and bringing on themselves disrepute and disaster, affording much scandal.

Khame called them together several times, vainly expostulated with them and drew attention to one of their number having incurred a fatal accident whilst under the influence of drink. On a later occasion, he said: "We black people are a long way behind; I wish that we may go forward; you ought to help me, and not set a bad example to my people; I foresee that some day one of my people, when drunk, will murder one of you and get me into trouble; I therefore insist that no more drink be brought into my country. I will fine anyone breaking this law." These repeated warnings produced no effect, and after a drunken fight amongst themselves, Khame assembled them and laid before them a list of nine as banished from the country. Afterwards, for various reasons, all to his credit, and showing refinement of feeling, he reduced the punishment in three cases to fines.

2. Last year was one of local famine. Khame, without the instigation or even the knowledge of any white man, gave the whole of his private means, equal to some 2000*l.* or 3000*l.*, to mitigate the sufferings of his people.

According to native law, all property is vested in the chief, who grants permission to build and guarantees undisturbed residence to all traders as long as the laws are complied with, but he does not permit such buildings to be sold.

The foregoing paper was read by SIR HENRY BARKLY, who added, at its conclusion, the following remarks:—

Speaking from his own experience in South Africa, he said he could confirm the favourable report that Captain Patterson had given of the chief, Khame. When he had the honour of acting as Her Majesty's High Commissioner in that part of the world, he received communications from missionaries, traders, travellers and others, all agreeing as to the excellent conduct of that chief and his tribe. Shortly before he returned to England Khame wrote to him and asked to be received as a British subject, and it was

with great regret that he had to inform him that the remoteness of his country rendered it entirely out of the question. The object of the chief at that time evidently was to be protected from the incursions of the Transvaal Boers. To a certain extent that object had since been attained by the annexation of the Transvaal to Her Majesty's dominions, so that Klame was no longer in any danger from the Boers. He had not the advantage of being acquainted with Captain Patterson, but probably some of those present at the meeting knew him, for he was a life member of the Royal Geographical Society. Those who were acquainted with him considered him a man of great intelligence and extensive accomplishments, a good artist, and able to take observations. That he was a man of very humane feelings, was evident from his paper which had just been read. He was no mere traveller for the purpose of curiosity or love of sport. He observed the features of the country through which he passed, and took a benevolent interest in the welfare of the races with whom he came in contact. He was evidently anxious that their motives and feelings should be correctly appreciated, and that they should be justly treated by those of European descent. In his second journey into the interior, in which he lost his life, he was selected by Sir Bartle Frere as his envoy to the chief of the Matabeli, who had been accused of interfering with the movements of traders and others. Captain Patterson was accompanied on that occasion by a young gentleman of very great promise, a son of Mr. Serjeant, C.M.G., one of the Crown Agents for the Colonies. Young Mr. Serjeant had gone out with his father when he was sent by the Colonial Office to make a report on the Financial State of the Transvaal. Finding Captain Patterson about to go on the mission to Lobengule, he obtained his father's consent to accompany him to that chief, and then to go on to the Victoria Falls. The mission to Lobengule was quite successful. A complete understanding was arrived at with him, and then they proceeded on their expedition to the Falls of the Zambesi, going first some thirty miles to a mission station called Shiloh, whence the son of the missionary, Mr. Thomas, undertook to accompany them as their guide and interpreter. They proceeded to a spot within three days of the Zambesi, where they drank the water of a certain spring, and almost immediately afterwards were seized with all the symptoms of mineral poisoning. All three whites, and five of the blacks who accompanied them, died in the course of a few hours. It was not to be denied that in the first instance there was in South Africa a suspicion of foul play. Lobengule was supposed to have connived at their death. Sir Bartle Frere and Sir Theophilus Shepstone set about a searching inquiry. There was every reason to suspect Lobengule, who did not bear the best of characters. It was known that he was unwilling that white men should penetrate into that part of the country, where he had recently subjugated the natives, and treated them with great cruelty. He had also been accused by a gentleman, a member of the Royal Geographical Society, Mr. Richard Frewen, of having thwarted him in his attempts to visit the Falls of the Zambesi, although he could hardly bring it home to him distinctly. On the other hand, though an unmitigated savage, Lobengule was quite shrewd enough to know the power of the British Government, and in his (Sir H. Barkly's) communications with him he always professed the greatest respect for the Queen and all her subjects, and showed great civility and attention to officers in the army who went with letters of recommendation to his territory to shoot. He always took care that they returned in safety. The Colonial Office had kindly favoured him (Sir H. Barkly) with the perusal of all the correspondence on the subject, and he was bound to say that the investigation threw no decided light on the story brought back by the natives, and which Lobengule had reported to the Government. That story was that after Captain Patterson's party had proceeded for fourteen or fifteen days, having been two days without water, they met with a Bushman, and insisted on his showing them the nearest spring.

Lobengule stated that the Bushman warned them that the water was of a deleterious quality, but that impelled by thirst they drank of it abundantly, and perished in consequence. Captain Patterson's friends and Mr. Serjeant's friends did not believe any warning was given, and they considered that most probably the springs were poisoned by the bushmen for the purpose of killing game, although he (Sir H. Barkly) had never heard in South Africa of any poison being possessed by the Bushmen sufficiently powerful to kill a man in such a short space of time. At all events there seemed nothing to connect Lobengule with the unfortunate occurrence. It took place at a very great distance from Lobengule's residence: it was almost impossible that he could know in what direction the party would pass, and according to his own account the water in that part of the country was, at certain seasons of the year, of a very poisonous nature. The only conclusion that could be come to was that this sad catastrophe, which had left three families to deplore the loss of young men in the prime of life, and had deprived the Geographical Society of a valued member, who no doubt would have been a very useful explorer, was due to natural or accidental causes, and that no further light could be thrown upon it by any investigation which could be instituted. That was the conclusion at which Sir Bartle Frere had arrived, and at which everyone who read the papers would arrive.*

The PRESIDENT was sure the Meeting was greatly indebted to Sir Henry Barkly for having read Captain Patterson's interesting paper. To that paper an additional interest had been communicated by the sad tragedy in which the expedition ended. They would all join with Sir Henry Barkly in a desire to pay a tribute of respect to such an enterprising and honoured member of the Society.

The Mountain Passes leading to the Valley of Bamian.

By Lieutenant-General E. KAYE, C.B.

(Read at the Evening Meeting, February 24th, 1879.)

IN direction W.N.W. from the city of Kabul,† and distant from it about one degree and twenty minutes of longitude, in a straight line, but some 112 miles by the mountain road connecting the two places, lies the valley of Bamian. Nearly forty years ago I traversed this route, with troops (six horse-artillery guns, a few cavalry, and a regiment of Goorkha infantry); and now, to the best of my memory, aided by such imperfect notes as I made at the time, I will endeavour to describe the country intervening between the capital of the Amir and the idols of Bamian.

Leaving the city, we pursued the Ghazni road through the beautiful valley of Kabul, bright with its orchards, and groves, and green meadows, watered by the river, or by smaller streams, the banks shaded by tall poplars and by willows. After passing Kila Kazi at the ninth mile, we quitted that road and inclined to the right towards the village of

* According to a letter since received from Sir Bartle Frere, statements have been subsequently made to Sir Theophilus Shepstone which throw doubt upon Lobengule's story, and afford but too much reason for suspecting that the unfortunate explorers were the victims of a foul conspiracy.

† For map, consult that of the Hindu Kush, in February number of the 'Proceedings,' p. 160.

Argandi, situated at the foot of a spur of the Paghman Range, which runs south-westerly from Charikar in the higher part of the Kohistan of Kabul. The route from Ghazni to the capital does not pass through Argandi, but leaves that village at some distance to the left, and thus avoids much rugged country, passing over a gentle rise in its progress to Kila Kazi.

From Argandi a narrow gorge with stony bed, interspersed with large boulders, leads by a steep ascent to the plateau which here surmounts the spur, and over which the road continues for some two and a half miles, in a westerly direction, thence descending to Rustum Khail in the valley of the Kabul River, which flows round the southernmost point of the spur just crossed, towards Maidan, on the road to Ghazni; and thence bending towards the north-east, visits the city whence it takes its name.

From Argandi to Rustum Khail is 8 miles. The valley is here about a mile broad, well-cultivated, and sprinkled with villages and orchards, while rows of poplars here and there mark the course of the stream. The valley narrows as Jalraiz (10 miles) is approached, and passing that place, the lower offshoots from the Paghman spurs sweep down to the banks of the river, terminating often in precipitous rocks, confining the road to the narrow stream which receives a small tributary brook, flowing from the north-west. Sir-i-Chushma, the principal source of the Kabul River, is 10 miles above Jalraiz, but a small feeder flows from the foot of the Unah Pass, some 9 miles in advance.

Above Sir-i-Chushma, the spurs sweep down, almost meeting on the banks of the brook; indeed, in many places the road necessarily mounts the hill-side, there being insufficient space below. There is but little cultivation above Sir-i-Chushma, but all available ground seems to be utilised; the population is scanty, but there are villages and forts also in occasional nooks among the mountains—of the latter, there was one picturesquely situated on a slight eminence below the lofty hills to the right, guarding, as it were, the approach to the higher part of the valley. As we neared the foot of the Unah Pass, the ascent became heavy. The general direction of the valley from Jalraiz is westerly.

It was on the 19th September that we reached the pass. Winter had commenced, though the crops had not yet been cut; we found ice on the ground on our arrival, somewhat late in the morning. At this point the elevation above sea-level was estimated at nearly 10,000 feet. The valley now terminated, and we ascended the pass. It was not one continuous pass, but a succession of several short but steep ascents and descents, the general features of the summit of the Paghman Chain being that of a broken, rugged table-land, riven by several deep chasms, and the breadth of the plateau from 4 to 5 miles. We encamped on the height, at an elevation of 11,400 feet; the Koh-i-Baba Mountain (18,000 feet) being visible, the centre peak bearing W.N.W. from our camp.

There was much snow on the ridges of this mountain, even at some distance below its summit. Around us nought could be seen, but a tumbled succession of bleak and barren hills, raising their bare heads one beyond the other in dreary confusion, save where snow-topped Koh-i-Baba dominated over all, black rocks protruding here and there prominently from its sides, too steep to form a resting-place for snow-flakes. A few patches of cultivation, still uncut, were to be seen in recesses having sunny aspects among the hills. Barley, wheat, lucerne, and vetches are grown in terraces on these mountains. Not a tree or a bush was visible to break the desolate monotony of the scene. In the distance ahead, a little west of north, the lofty range, in which are the passes of Kalu, Hajikak, and Irak, bounds the view.

Clearing the Unah, we passed over four spurs branching from the mountain on our left, and emerged into the valley of the River Helmund at Gardan-i-Diwar. This river, rising some 20 miles to the north-east, here divides the Hindu Kush and Paghman ranges, receiving the small streams flowing from the base of both.

The Helmund is but a shallow stream at this point, and the valley narrow, but every inch of ground is cultivated. The banks of this river, unlike those of the Kabul, are bare of trees and shrubs; but tolerably well-clothed with grass.

Fording the river at its junction with a small but rapid stream flowing from the Hindu Kush, we entered the glen of the Siah Sung ("black rock"). The defile is narrow, the hills rising abruptly; and the stream meanders greatly, having a rough, stony bed. At about $6\frac{1}{2}$ miles from the Helmund, a wall of black rock (giving its name to the glen and to the stream) stretches across the defile, leaving but a narrow passage for the brook; and half a mile beyond it, on a small plateau, above the channel, there stands (or stood at that time) the small mud fort, called Siah Kila. Between this place and the Helmund, we had crossed the little rivulet more than twenty times, and frequently had to leave the bottom of the valley, and pursue a track running along the hill-side.

At Siah Kila another defile, branching from the west, opens into that by which we had ascended from Gardan-i-Diwar, and through this opening we had a fine view of Koh-i-Baba, bearing W. 15° S.

Six miles higher up the valley of the Siah Sung stands the fort of Kharzar. Our route generally led along the bottom of the defile, crossing the rocky stream frequently, but occasionally we ascended the hill-side to avoid marshy ground, and then again were compelled to leave the higher road by the occurrence of ravines, the channels of small feeders flowing from Koh-i-Baba on our left. The spurs shooting down from this mountain generally terminate in plateau or terrace ground, some 60 feet above the stream, but those from the east continue nearly unbroken to the very edge of the rivulet, so that all the available land that the

nature of the country allows to the mountaineers is generally to be found on the western slopes, but for some distance between Siah Kila and Kharzar, the spurs of the Koh sweep down in continuous slopes from the eastern peak to the brook itself.

The fort of Kharzar, like that of Siah Kila, is on some elevated table-land above the valley. Koh-i-Baba bears S.S.W. Much snow appears on the face of the mountain present to our view. The direction of the valley from the Helmund to Kharzar is generally north-west, though variations are frequent owing to the sinuosities of the route.

The foot of the Irak Kotul (pass) is $5\frac{1}{2}$ miles north of Kharzar; the slopes of the mountains on either hand now unbroken by plateaux. We found the passage of the mountain by no means difficult; there was a good road at an incline of from 25° to 30° , which had been lately made or improved under the direction of some British officers. The ascent was about a mile and a quarter, and of course the transit of artillery entailed much labour, but the mountaineers were friendly, and gave great assistance. The descent on the western face was steeper, but of less length. Last year's snow still existed at the foot of the pass on either side: on the east, round the source of the Siah Sung rivulet, 1000 feet below the summit: and at the further base a small stream there rising had forced its way through the snow, and an arch or tunnel had been formed, through which a man might walk; this stream flows to the north, and eventually the water enters the basin of the Oxus. The summit of the pass was estimated at 13,000 feet above the sea. Hence there is an extensive mountain view, on all sides brown, bare mountain tops and slopes succeeding each other, like the following waves of a stormy sea, no forests, brushwood or verdure to relieve the poverty of the view. The snow of Koh-i-Baba offers a little change to the aspect, and the lower hills stretching towards Turkistan are more red in hue than those through which we had lately passed.

The road from the foot of the pass continues in the narrow valley, through which flows the small stream above mentioned; lofty and precipitous are the hills which enclose the defile, so that the sun even at the autumnal equinox fails to reach the bottom for more than half its allotted time. The Irak hill itself is smooth and almost free from rock, but lower down, descending rapidly and frequently crossing the brook, which flows generally to the N.N.W., the hill-sides become more rugged and abrupt, rising in places like iron walls, a stupendous height.

The small valley of Mian-i-Irak is about 10 miles distant from the pass. Here we found some open ground, well cultivated, the crops just cut (4th October); and the hills which surrounded it of no great altitude. There were several small forts to be seen in the valley, and some caves in the hill-sides, forming dwelling-places for some of the inhabitants. Here too again, for the first time since leaving Sir-i-Chushma and the pretty valley of the Kabul River near Jalraiz, we

saw trees on the banks of the stream (now increased in volume), willows and poplars, but of stunted growth. However, such as they were, they gladdened the sight, too long wearied with barren hills. There are excellent trout in the river, some about 2 lbs. in weight. In the stream flowing towards the south there are no trout, but small barbel. A small pool at Sir-i-Chushma was crowded with these fish, eagerly looking for crumbs from anyone approaching the margin; indeed, the fish were so numerous and so tame, that they could be caught easily by the hand. However, they were quite respected, and no one thought of injuring them.

After leaving Mian-i-Irak, the road does not continue to follow the course of the stream, which flows through deep chasms in the hills, till it empties itself into the river, which, after watering the Bamian Valley, flows eastward, and subsequently to the north, under the name of the Kunduz River. Quitting the small valley, our route led us more westerly, across a rugged spur of the Hindu Kush, separating the water channel of the Irak from that of Kalu. Though the height of this mountain ridge is insignificant, yet it gave us an infinitude of toil from the rocky nature of the spur, and the steepness of the incline, in several ascents and descents. Ultimately the track led us into the valley of Bamian, at its eastern extremity. Though the distance was only 6 miles from Mian-i-Irak, the march was not accomplished in less than thirteen hours.

At night, on the 5th October, our camp was formed on the left bank of the Kalu stream, and on the right of that flowing from Bamian, at the junction of the two waters. The gorge of the defile leading from the Kalu Pass was on our left, as we looked to the west; and at its entrance on the summit of a lofty insulated rock, with perpendicular faces, frowned down the ruined fortress of the Emperor Zohauk, whence the place takes its name. At this extremity the valley is about a quarter of a mile in breadth, and well-cultivated, the immediate hills bordering on it of no great height. The Bamian River, rapid and of some volume, though generally fordable, hides itself in a rocky passage, dividing the spurs branching down from the southern and northern ranges. It takes its rise from the foot of the westernmost extremity of Koh-i-Baba, as do also, I conjecture, the rivers which water the parallel valleys of Saighan and Kamard.

The great image cut in the face of the cliff bounding the valley on the north is 9 miles from Zohauk. The valley winds much, varying in width, generally not more than a quarter of a mile broad, until Bamian is reached, where it opens out considerably. It is well cultivated, but there are few trees. Several narrow glens, the channels of streams flowing from the Koh, on the south, fall into this valley; one of them is at Topchi, or Ahinghar, a small fort about half-way from Zohauk. But the largest, which is indeed a valley itself, having numerous

terraces of fields on either side of the rivulet, joins that of Bamian nearly opposite the images: this is the Fouladi Vale. The two streams converge in the main valley, and unite near a small fort situated in the fork itself.

Higher up, near the idols (of which I have little to say except that they are very large and very ugly), there are, or more correctly there stood at the time whereof I write, three forts, forming together a triangle: two of these, having four towers (one at each corner of the square), were assigned to the infantry; and the third, a double fort, with six towers and a dividing wall in the middle, to the artillery, for the accommodation, one part, of the men, the other of the gun horses: the cavalry were sent back to Kabul. The political officers and their escort were lodged at the confluence of the rivers.

Near the foot of the great image, on some rising ground, there were the ruins of a fort, which must have been of considerable magnitude, much stronger and more capacious than any of those still existing in the valley. Between the images and at their sides, peeping over their shoulders, and some even above their heads, were many caves in the cliff side, having intricate connecting approaches, and galleries cut within the rock. These formed dwellings for many Bamianchis, and also for some camp followers of the British.

On the opposite side of the valley, about a mile to the west, a stony gully leads into the hills: a short way up this, there is a nearly insulated rock, on the flat summit of which there is in relief a recumbent figure bearing a rude resemblance to a huge lizard, and near the neck of the reptile there is a red splash, as of blood. This is called the Azdahar, or dragon, said to have been slain by Ali or some Mahomedan saint of by-gone days, and an indentation in the rock close by is held to be the gigantic footprint of the slayer.

Higher up the valley (the direction of which looking from Zohauk, was generally, taking its bends into consideration, W.S.W.) were several other forts jotted here and there, until at about 5 or 6 miles from the position we had taken up, the open cultivated land terminates at the Surkh Durwazai ("Red Gate").

It was here, near the forts just mentioned, that the Amir Dost Muhammad, with his Usbeg army, suffered defeat at the hands of a small detachment under Brigadier Dennie, C.B., on the 18th September, 1840.

The mountain ridges north and south of the valley, differ much in appearance and in character. Those to the north are of reddish hue, of no great height and irregular in outline, easily worked by pick-axe and crowbar, but incapable of cultivation: there are, however, recesses in their depths, where long, coarse grass is to be found. On the other side the Koh-i-Baba forms the main object in the range of sight, rising in several magnificent peaks, pointing sharp and rigid against the clear blue sky, the rock, where the sides are too steep to receive snow,

being black invariably. From these peaks grand spurs slope downwards towards the valley in great regularity, separated from each other by the water furrows. I have previously mentioned two of these beds, one at Topchi, the other from Fouladi to Bamian; between these are others, of less width than the last, some of them dry except at certain seasons of the year. At the mouth of one of these, lower down the valley than the forts inhabited by the British, is a curious conical hill, with a spiral road round it, and several old ruins, both at the summit and on the sides. This goes by the name of Gulgula, so called, it is said, from the noise made by the labourers while employed on the works.

Before these spurs reach the valley near our position, there at its greatest breadth (from half to three-fourths of a mile), they merge into spacious table-lands, rising in terraces towards the higher parts of the dividing spurs, but flat, where they overhang the larger valley, into which they terminate by a steep drop of 50 or 60 feet, but practicable to climb. These plateaux and terraces are all well cultivated and irrigated in scientific fashion. The husbandmen in these mountains (and indeed I may say in Afghanistan generally) are excellent practical hands at finding the true incline which will cause water to flow without wasting the slope. The water is brought from the head of the spring, at the foot of the mountain, and, by channels cut in the hill-side, is conducted at last to the fields and terraces on the spurs. Six or seven miles up the Fouladi Valley there is a group of small forts, known by that name, some on points of spurs, some in the valley below; and on the plateau just above Bamian there are others, one of them, Allahdad Khan-ka-kila, larger and of better construction than those usually met with.

There are but few trees or bushes in the valley of Bamian; but each fort has a tree or two near its gate; and between the two rivers, opposite the débouchure of the Fouladi Valley, there is a Ziarut, where a stone wall encloses a thick grove of handsome silver ash, and beneath the trees there are a few old tombs.

The inhabitants of the valley are Tajiks, but those of the Hindu Kush mountain chain are Hazáras: I think the Dehzungi and Yek Olung Hazáras are two principal tribes. At the time whereof I write, there was feud between them. But during our sojourn of a year and a day in those regions, we found Tajiks and Hazáras peaceful and well disposed, except that there was a temporary quarrel with some people at Fouladi. To the north there are Tatar Hazáras, and in the Saighan and Kamard valleys Usbeks, Tajiks, and Ajurees; but I have not a very accurate knowledge of the many tribes dwelling in those mountains and their valleys. The Tajiks and Hazáras about Bamian are fair in complexion, the children, many of them, as white as our own.

Sheep are plentiful, browsing on the hill-side, where aromatic herbs are to be found. In the hills northward of the valley, there are wild sheep and goats, but they are difficult to reach. The hill partridge,

or chikore, is to be met with in the gullies to the south, and a large bird on the higher mountains, where there is eternal snow, which I have heard named the snow pheasant, but is more like grouse in plumage, and in being feathered low down the legs; the flesh, however, is white, and somewhat coarse. Teal I have found on the rivers, but only for a short time in autumn and spring. In the winter, when snow was on the ground, there were large flocks of blue pigeon, which formed a pleasant change on our table, our almost invariable food being the dumba or broad-tailed sheep. In some places I have seen emerging from or retreating into burrows in the hill-side, small animals resembling a tailless rat, rather larger, with ears nearly as long as a rabbit, but smaller than that animal, though in colour more resembling it.

The rivers abound in fish—barbel, and trout—the former I had seen before in the Kabul River, the latter are only indigenous in the streams flowing to the north; neither of them grow to any great size, as a general rule, but I have seen a few trout exceeding one and up to two pounds in weight: they have black and red spots, and the flesh of the larger fish is of salmon hue. I was informed that in the Kamard Valley trout were to be seen of double that weight or more. In the summer months the rivers were seldom clear enough for fly-fishing owing to the melting of the snows; but both kinds took the worm readily.

Wheat, barley, the field pea, turnips, lucerne, and some Indian corn were grown at Bamian: there was very little grass procurable, and in the winter our horses were fed on barley, dried lucerne, and chopped straw.

Winter set in early; a few flakes of snow fell in the valley on 6th October, but the first heavy fall was on the 15th. The valley was clothed in snow for some months, during which time for the most part the sky was perfectly clear, without a breath of air; the exceptions were previous to a fresh fall of snow, when clouds rolled up, and the temperature rose somewhat: then the snow came down, and the same calm weather recurred. In January the thermometer stood frequently at 12° below zero (Fahrenheit) at sunrise. The rivers, rapid as they were, froze hard, and British officers skated at Bamian (our skates were manufactured by a soldier of the 13th L.I., which regiment was quartered at Kabul). At the end of February the river ice broke in the centre, owing to the force of the stream below it, and the blocks were thrown up on either bank; but it was some time before they melted. For four or five months the mountains intervening between our position and Kabul were impassable except by pedestrians. An officer (Captain Garbett, appointed to the troop of horse artillery), journeying from Kandahar to Bamian, was compelled to walk from Argandi to Zohauk, which he reached on 1st March. Sometimes, indeed, even footmen (Hazáras) could not cross the mountains. At one time we received no post or messenger from Kabul for three weeks, and at another we

were fourteen days without intelligence from the south, though the passes to the north were open. From time to time we were informed of the progress of the Russians towards Khiva; and we had reason to believe that Usbeks and others, between Saighan and Khulm, had no friendly feelings towards us. We had not been idle, however, before the extreme severity of winter came upon us, but had constructed a trilateral, connecting the three forts containing our barracks, with fieldworks, which would have withstood any surprise from neighbouring Begs.

In the summer the climate of the valley was excessively pleasant, the thermometer in the shade being rarely above 68° or 69°. A few days it mounted to 75°, but in the neighbouring valley of Saighan it was 10° higher than that temperature.

Dr. Lord, a traveller of no mean note, was our political agent. He had great knowledge of the country and of the people, but as a politician, he was of a restless spirit; so that he soon discovered that a "rectification of frontier" was desirable. In December, therefore, he caused Saighan to be occupied; and in the early summer, Bajgah ("eagle's resting-place"), in the Kamard Valley, became our most advanced post. But in urging these forward moves, Lord had in view that they would facilitate greatly our ultimate establishment on the Oxus, for there, he held, we should find our only scientific frontier. And to Khulm I believe we should have marched some day, had affairs proved propitious; but as Dost Muhammad travelled southward, he shut the road to the north against us.

I have mentioned at a previous page the "Red Gate," where the Bamian Valley closes some 5 or 6 miles up the stream. The road to Ak-Robat here enters the Surkh Darra, a narrow defile enclosed by red cliffs of no great altitude. For about 5 miles the route continues along the banks of the stream, crossing it occasionally, then mounts, by a winding road, by no means difficult, the hill-side on the right; and then for some miles passes over an undulating table-land, until crossing a small spur, it descends into the valley of Ak-Robat, very confined in space, being merely a small basin among the hills. The cold was great in December—thermometer at 4° (or 28° of frost); distance from Bamian 15 miles nearly north-west. To the north of the small fort, scarce half a mile distant, rises a lofty mountain, over which the road to Saighan continues; the passage by no means difficult, as the hill is smooth, and free from rock. We had no guns with us, however, on this march.

From Ak-Robat to Saighan is a continuous descent, the distance 22 miles; as the road leaves the foot of the pass, the defile decreases in width, and the enclosing rocks increase in height. I cannot venture to give their height, but in this descent they are more stupendous and abrupt than in any of the marches previously described. The glen is excessively tortuous, so that the traveller often finds himself as it were

enclosed within four black walls of rock, like a dungeon, allowing only a small square of blue sky to appear at the summit. During the short days of mid-winter, the sun's rays could not reach the bottom of such gloomy defiles. Consequently, the rapid rivulet running through it became blocked by ice, then, overflowing its banks, spread over the surface from wall to wall, and the base of the glen became a sheet of ice. Burnes, in his *Travels*, mentions defiles of this nature, but I do not remember whether he wrote of those leading towards Saighan, or of some more in advance beyond the Kara Kotul: he traversed these mountains in the summer, I think.

About 14 miles from Ak-Robat, the road enters the small valley of Iliatoo,* well cultivated, larger than that last visited, but scarce a mile in extent at its greatest measurement; then again, rapidly descending, the track follows the stream, generally on its right bank, passing into a defile, the bounding walls of which are lofty indeed, but less imposing in their altitude than those which we had left.

The fortress of Sir-i-Sung is perched on an insulated rock, at the spot where the route just described enters the valley of Saighan. Here the stream flowing from the base of the Ak-Robat Pass joins the river, which waters the larger valley, nearly parallel to that of Bamian, but of less extent from west to east and of less general breadth. Sir-i-Sung ("the summit of the rock") is about 22 miles north of Ak-Robat: its position is imposing, as it dominates over the vale, but it is itself commanded by the northern hills, at a distance of only 200 yards. In this fort a garrison of Goorkhas was quartered. Subsequently, in the month of August, 1840, when our occupation of Bajgah had aroused the slumbering hornets, the small detachment at Saighan was strengthened by the addition of two horse-artillery guns.

There was no difficulty in the march of artillery from Bamian to Saighan, but the passage of the Ak-Robat Kotul caused much labour; less, however, than that of Irak. Saighan is a cheerful green valley in summer, and it possesses a few orchards, of which Bamian is destitute. It is separated from the valley of Kamard by a rocky mountain ridge of no great height or breadth, across which there are two passes, both impassable by wheeled carriages, one leading from the west of Sir-i-Sung, direct upon Kamard; the other commencing some miles down the valley to the eastward, and conducting to Bajgah, the fortress in British occupation, which is situated near the entrance to the defile leading to the Kara Kotul. The first mentioned of these passes is the Dandan-i-Shikan ("teeth-breaker"), the second is termed Nal-i-Ferash ("carpet of horse-shoes"). It was by this latter pass that the Goorkha regiment marched, when it proceeded to occupy Bajgah at the close of June. The detachment took with it one 3-pounder gun and two 5½-inch mortars on mules; but the pass was difficult under any circumstances; and when

* Identical with Sokhta Chunar, I believe.

the post was abandoned in September, these pieces of ordnance were sunk in the deep river of Kamard, which in its after course, like those of Bamian and Saighan, joins the river of Kunduz, flowing northward into the Oxus. From Bajgah a steeply ascending defile leads to the Kara Kotul. This was reconnoitred in May, and found to be one of great difficulty, the ascent over huge layers of rock, quite impracticable for artillery on wheels.

About 3 miles from the fort of Sir-i-Sung, the road to the west enters a hill gully, and reaches the foot of the Dandan-i-Shikan ascent: this is the direct route to Kamard, as the path over the Nal-i-Ferash is to Bajgah; the two places are 9 miles apart.

Towards the end of August, it appeared to Dr. Lord advisable that the 6-pounder guns should be advanced into the Kamard Valley. Accordingly trunks of trees were hollowed and prepared for the conveyance of the pieces themselves, while it was intended that the ammunition and the carriages taken to pieces should be transported on camels over the difficult pass intervening between the valleys. Circumstances compelled the political officer to forego this proposed forward movement. The intention, however, rendered it advisable that we should examine the ascent. The guns and the regiment (an Afghan levy in the service of Shah Shuja) had reached the foot of the pass, and the reconnoissance was effected before any change of plan had been considered necessary.

The ascent of the pass we found to be a mere bridle-path, narrow and tortuous, in the rocky scarp of the hill-side; so narrow that the outer stirrup at times hung over the precipice edge, and the bends so frequent as to occur within a few horses' lengths. It would have been difficult to draw the guns in their cradles, formed of hollow trees, up such a pass, as there was not length for a good pull at the ropes. At the summit we rode over a broad undulating table-land, over which guns could have moved freely: the breadth of this plateau is from 4 to 5 miles. We did not attempt the descent leading to Kamard, as the holders of the forts at the foot of the pass were hostile to us. The valley of Kamard is a deep, narrow glen, with many orchards and walled gardens.

In some recent maps, I have observed that the ascent to the plateau is termed the Saighan Pass, while the descent only is marked as the Dandan-i-Shikan; but at the time whereof I write, certainly the whole pass, ascent, table-land, and descent, was known by the latter name. It is in fact only one pass, extensive indeed, but so is the Unah Pass, in which occur several ascents and descents, and intervening ridges and plateaux. The entire distance from Sir-i-Sung to Kamard is from 10 to 12 miles. I have also seen mention made of late years of the "Bamian Pass"; the Russians, I think, use the term. But I do not know which of the Kotuls it may be intended to so designate: there are the Kalu, Hajikakk

and Irak passes over the Hindu Kush chain, and the smaller ghaut over a spur leading down upon Zohauk, known by the Hazáras as the Kuski—an appropriate name enough.

I have before stated that the lofty passes of Unah, Irak, and Ak-Robat, being over rounded hills, tolerably free from rock, although laborious to surmount, yet entailed no real difficulty. They were, however, far more serious obstacles than we had to encounter in other parts of Afghanistan, such as the Bolan, the Kojuk, and the Khaibar. The Kuski, considering its low elevation and the shortness of the ascent, gave more trouble than the great passes; and the passes northward of Saighan would require much engineering skill devoted to their improvement, to render the passage of any save mountain artillery feasible. When we crossed the great range, we had all the advantage of doing so not only unopposed, but with the assistance of a friendly population. To fight the march would be a different matter; and the poverty of the country, and narrow nature of the glens and defiles would prove a serious obstacle to the progress of an army.

The following discussion ensued on the conclusion of the above paper, and that of Mr. Markham's on The Basin of the Helmund ('Proceedings,' March number, p. 191), read the same evening:—

The Chairman (Sir RUTHERFORD ALCOCK) said it was rather difficult for those who were not specially acquainted with the districts treated of in the papers just read, to seize the many points of great interest which they contain, but at the present moment important political questions were connected with those regions, and the movements of the British troops through their intricate passes were objects of national concern. The authors of the papers had therefore rendered a service in aiding them to understand as far as possible the various details of a country so complicated in its physical features.

General THUILLIER (late Surveyor-General of India) said as he had had something to do with the original construction of all the maps that had been issued from the Survey Department in India for the last thirty years, from which all the new maps of Afghanistan had been taken, the meeting would perhaps permit him to say a few words on the subject. His chief object in rising was to beg the kind consideration of the Society for the attempts that were now being made by the band of survey officers, unsurpassed by any in the world, who were accompanying the forces that had recently penetrated into Afghanistan. The great difficulty that had been experienced in India in attempting to make maps of Afghanistan, was the absence of authentic data, and of a great portion of the materials that were collected by such men as Durand and Sale of the Engineers, and others, who took routes and made sketches of the country in the first war; the consequence being that in such an extensive area as that represented in the general map before the Meeting there was much of a conjectural character, inevitable where regular surveys could not be conducted beyond our frontiers. Unfortunately, from the want of organization in India, and of a systematic deposit of all geographical materials in the surveyor-general's office at that time, those sketches and route maps were not looked after. Since then great efforts had been made, though it was only within the last few years that it had come to his knowledge that through the indefatigable exertions of their excellent Secretary, Mr. Clements Markham, many valuable documents had turned up

which were deposited thirty or forty years ago. The work of Captain Fraser Tytler, attached to the Quartermaster-General's Department in the first war, had come to the front, and various other less important materials. They had all been incorporated and put together recently under the orders of the Topographical Department of the War Office by Major Wilson, R.E. In the present campaign every precaution had been taken to send with each force a band of officers and assistants who, he was sure, would do everything in their power to lay down as much of the country as possible. With General Browne's force there was Major Tanner, a splendid topographer, one of the best men for sketching ground to be found in any country. With him was Captain Samuels, who did excellent service at Ali Musjid, with his plane-table before him, under the fire of twenty-four of the enemy's guns. A cannon ball passed between the legs of his plane-table, but he never flinched from laying down the ground. He grieved to say that from the toil and exposure to which he was subjected this excellent officer caught a fever, and was carried back to Peshawur, where he recently died. A greater loss to the department could not be. He was happy to see that the 'Times' that day had done the justice of inserting an account of the services of this officer. With General Roberts' column there was another excellent surveyor, Captain Woodthorpe, R.E. The newspapers had recently recorded an admirable feat by that gallant young officer. Notwithstanding his duties with his plane-table, and his sketching and observations, he was one of the first to enter a stockade that had just been taken. But unfortunately he jumped in before the enemy were out of it, and having found out his mistake he very quickly jumped back again; but his coat was riddled, his pistol knocked to pieces, his pouch-box pierced, his back grazed with a ball that ran round inside his coat, and yet he escaped, and General Roberts did him the honour of saying that he was one of the best men in his column. With the third column was Captain Rogers, R.E., who was carrying on a triangulation from Sakkar, on the Indus, where the line of the great triangulation of India extended from Karáchi, and he was in great hopes that the triangulation would be continued through the Bolan and Quetta, and that on that triangulation the topography of a great portion of that part of the country would be based. By the services of these officers he hoped that when the army came back, such an amount of information would be obtained as would materially modify the existing maps, and he could assure the Geographical Society that whatever was possible, would be done by the officers who were connected with the Survey of India.

Sir T. DOUGLAS FORSYTH said that he was personally acquainted only with that part of the region, embraced in maps of Afghanistan, which lay far to the north of the Bamian Pass. He wished to bear his humble testimony to the accuracy of one part of General Kaye's paper, and that was with reference to the character of the passes in those parts. One of these passes was at least 13,000 feet high. People who were accustomed to the hilly districts of England, Scotland, or even Switzerland, might think there must be great difficulty in getting over such high altitudes, which appeared great heights for a pass, but he had observed in the Himalaya that altitude really had nothing to do with the difficulties of an ascent. Much depended on the position of the mountains—whether they were acted upon chiefly by great rains or were merely subject to the influence of snow. The monsoon rains did not fall on this part of Afghanistan with that strength with which they fell on the Himalaya, and where mountains were only subjected to the influences of winter snows, there were no such deep ravines or abrupt slopes, and the undulations were more easy, rendering it comparatively easy to get over the great altitudes. That was a point of very great importance, whether they have to consider the matter politically with reference to the advance of armies, or commercially, with reference to the opening out of roads for caravans. In reading a paper which Mr. Markham had contributed

to the last number of the 'Proceedings,' in which the heights of the passes were given, he was much struck by the fact that the pass leading from the Pamir, viz. the Baroghil Pass over the Hindu Kush above Chitral, was only about 13,000 feet. Major Biddulph, who was one of the officers who accompanied him (Sir D. Forsyth) to Cashgar, on his way to Wakhan ascended Baroghil Pass, and reported it as one of the easiest passes in the world, in fact, almost no pass at all. The ground rose to it in a succession of undulating slopes which could be crossed by wheeled carriages with perfect ease. This was a matter of great importance when it was remembered that this route led direct from Peshawur up the Chitral Valley over the Pamir into the country of Cashgar. The difficulties of the passes, therefore, must be estimated not with reference to the actual heights but with reference to other considerations.

Sir WILLIAM L. MEREWETHER had lived for nearly forty years in a part of India which lay near Afghanistan, west of the Indus, and he had paid great attention to it. His home was the dry part of Sind (Scinde), south of the mountains, between the sea and the mouth of the Bolan Pass. In the present state of affairs he considered that region to be one of great importance, as it was really the direct line between England and Candahar. Artillery and troops could be embarked in the London docks, taken down the Thames and the Channel, by the Mediterranean to the Suez Canal, down the Red Sea and so on to Karáchi. From that point to the Indus there was a line of railroad, 105 miles long, to Kotri. It had then been carried along the right bank of the Indus to Sakkar. That was the line of railroad which was very aptly called by Sir John Lawrence, when he was Viceroy of India, "the missing link." He was happy to say there was no longer a missing link, for the Indus Valley Railway was now completed to Múltán. A force at Quetta or Candahar could be readily reinforced from Karáchi and Múltán (Karáchi being the proper base), from Bombay and from England. Communication from Karáchi to Sakkar would be a matter of sixteen hours; from Sakkar to the mouth of the Bolan was 150 miles, which, if a light railway was laid down, as he hoped soon would be the case, would be a matter of ten hours more. From the mouth of the Bolan to Quetta was about 82 miles. From thence to Candahar there were no great difficulties which an army could not easily surmount, as had recently been proved by General Stewart's column, which merely experienced a slight check at the Kholuk Pass, and not only met with no opposition from the people, but received cordial assistance. Sind held a very important position with regard to the future support of troops at Candahar. With regard to the question of supplies at Candahar, the valley of the Indus was one of the richest with which he was acquainted, except the valley of the Nile. It was similar to Egypt in most respects, and has for long borne the name of Young Egypt. That being so, it afforded an admirable market for the demands of the troops above the Bolan Pass, and as long as these remained at Candahar, he thought there need be no difficulty in furnishing them with all things requisite for camp or cantonment life. He wished to bear testimony to the excellence of one of the officers whom General Thuillier had alluded to, namely, Major Tanner, who was one of the first surveyors of the hills of Beluchistan, and his survey was so absolutely accurate, that when some years ago he (Sir W. Merewether) spent two months among those hills, he could always on the maps furnished by the Surveyor-General's Department point with a pin to the exact spot where his tent ought to be pitched. He did not think there could be better testimony to a surveyor's care and accuracy than that.

Sir HENRY RAWLINSON said Mr. Markham's paper had been put together with a great deal of skill and care. It gave a very accurate representation of the country which it described, and altogether was a very valuable contribution to geography. There were, however, a few small points on which, *en passant*, he might offer some

corrections. In the first place, the estimate of the size of the Argandáb was rather exaggerated. He did not believe that that river ever joined the Helmund, but was all absorbed in irrigation. About 15 miles indeed from the Helmund a large embankment had been made by Emir Timúr to arrest the water, and he had always understood that no portion of the stream now passed the *Bend-i-Timúr*. Of course the Argandáb was technically an affluent of the Helmund, because if there was sufficient water in the bed it would reach that river, but in those countries it required a very large body of water indeed to meet the calls of irrigation, and the absorbing nature of the sand through which it passed. Then again, the Tarnak Valley could hardly be called a ravine. For the greater part of its extent it was at least 10 miles wide. It was indeed a good open valley, with the high road between Kahul and Candahar running along it. Mr. Markham had hardly drawn sufficient attention to the main features of the orography of the region, the great point being that between the Helmund and the Suliman Range, the elevation of the hills was much less than that of the two culminating ridges. The intermediate hills indeed were not more perhaps than 2000 or 3000 feet above the plain, and presented no obstacles to an army. These were small matters, but it was as well to notice them, and he was sure Mr. Markham would take his corrections in good part. He further thought the great range, the continuation of the Koh-i-Baba, had been examined by Arthur Conolly, who passed direct from Bamian along the skirts of the mountains, and whose journal had been published in the 'Calcutta Review' many years ago. Conolly was the only person who had actually followed the skirts of the hills from Bamian to Maimeneh, though several officers had passed from Herat to Kabul by the route through Afghan Turkistan. The River Helmund was one of the most famous in Asia. In the *Vendidad Sadé*, one of the earliest of the books of Zoroaster, the Helmund was given as one of the original settlements of the Aryan race, being in fact the only river mentioned in the whole ethnographical scheme. From that time to the present it had always been a great geographical and political feature. In recent history it had been considered the boundary between Persia and India. The Mogul Emperors indeed were accustomed to say, "The Helmund is the ditch and Candahar is the fort which guard India from the west," and that was undoubtedly a true description of those great physical features. Of course political accidents might for a time distort such features, but ultimately the old principle of distribution must be revived, the Helmund to the west, and the Hindu Kush to the north being the natural boundaries of India. General Thuillier had expressed his regret that in former times so little attention was paid to the geography of the country. Now he (Sir H. Rawlinson) had been in Afghanistan for three years during the old war, and received the medal of the Royal Geographical Society during our occupation of the country, so that he naturally took considerable interest in geography and did everything in his power to obtain information, but he really could not do much. He was usually engaged for eighteen hours out of the twenty-four on hard official work, having to feed the army and govern the country over and above his ordinary political duties. Under such circumstances it was quite impossible for him to spend his time in surveying. During the greater part of the time he was at Candahar, there was not an engineer officer in the place, the only two with the force, Captain Saunders and Lieutenant North, being employed at Herat, so that at Candahar he was entirely dependent for collecting geographical intelligence on the Quartermaster-General's Department. There were, it is true, some accomplished officers in that department, Fraser Tytler being one, and he (Tytler) did obtain a considerable amount of information, and embodied it in the map of the Helmund Valley to which Mr. Markham had recently given publicity. He (Sir Henry) was pleased to know now that the claims

of geography had come to the front. In sending the forces into the field, the Government, inspired no doubt in a great measure by General Thuillier, had provided, it seemed, ample means for obtaining geographical information which would last for all time, and probably would be the most valuable result of the present expedition. He himself was now in correspondence with General Biddulph, who had already sent home some very valuable reconnaissance maps of the southern part of the country. The General indeed had conducted a reconnoitring force 50 miles to the east of Quetta as far as Amadun, and his sketch map of that region contained entirely new geographical information. Sir Henry had recently received a letter from General Biddulph which was written just as he was starting from the Helmund, and in that letter the General said he would take care to get a sketch map of that region, so that as far as the western part of Afghanistan was concerned a considerable accession to our geographical knowledge might confidently be expected.

General THUILLIER wished to add that two other officers of the Survey Department of India, Captain Holdich, R.E., and Captain Maxwell Campbell, R.E., having received a telegram offering them employment with the army in Afghanistan, had left London at two or three days' notice for that express purpose. Lieutenant E. P. Leach, R.E., had likewise returned to India for a similar purpose.

Sir HENRY RAWLINSON, in reply to a question put by Mr. J. L. HADDAN respecting the height of Lake Sistan above the sea-level, said he believed it was between 800 and 1000 feet.

The CHAIRMAN congratulated the Meeting on the large amount of interesting information which had been elicited by the discussion. Sir Henry Rawlinson had spoken of the ditch and the fort which were considered by the great Mogul conquerors long ago to be the true defences of Western India. No doubt this view was right, but it was one which Englishmen were only within the last few years apparently beginning to appreciate at its full value. Whatever might be the political results of the present movement of military forces in Afghanistan, it must be very satisfactory to find that at all events a great deal of accurate topographical and scientific knowledge would be obtained.

On the Colouring of Maps. By Professor CAYLEY.

THE theorem that four colours are sufficient for any map, is mentioned somewhere by the late Professor De Morgan, who refers to it as a theorem known to map-makers. To state the theorem in a precise form, let the term "area" be understood to mean a simply or multiply connected* area: and let two areas, if they touch along a line, be said to be "attached" to each other; but if they touch only at a point or points, let them be said to be "appointed" to each other. For instance, if a circular area be divided by radii into sectors, then each sector is attached to the two contiguous sectors, but it is appointed to the

* An area is "connected" when every two points of the area can be joined by a continuous line lying wholly within the area; the area within a non-intersecting closed curve, or say an area having a single boundary, is "simply connected"; but if besides the exterior boundary there is one or more than one interior boundary (that is, if there is within the exterior boundary one or more than one *enclaves* not belonging to the area), then the area is "multiply connected." The theorem extends to multiply connected areas, but there is no real loss of generality in taking, and we may for convenience take the areas of the theorem to be each of them a simply connected area.

several other sectors. The theorem then is, that if an area be partitioned in any manner into areas, these can be, with four colours only, coloured in such wise that in every case two attached areas have distinct colours; appointed areas may have the same colour. Detached areas may in a map represent parts of the same country, but this relation is not in anywise attended to: the colours of such detached areas will be the same, or different, as the theorem may require.

It is easy to see that four colours are wanted; for instance, we have a circle divided into three sectors, the whole circle forming an *enclave* in another area; then we require three colours for the three sectors, and a fourth colour for the surrounding area: if the circle were divided into four sectors, then for these two colours would be sufficient, and taking a third colour for the surrounding area, three colours only would be wanted; and so in general according as the number of sectors is even or odd, three colours or four colours are wanted. And in any tolerably simple case it can be seen that four colours are sufficient. But I have not succeeded in obtaining a general proof: and it is worth while to explain wherein the difficulty consists. Supposing a system of n areas coloured according to the theorem with four colours only, if we add an $(n+1)$ th area, it by no means follows that we can *without altering the original colouring* colour this with one of the four colours. For instance, if the original colouring be such that the four colours all present themselves in the exterior boundary of the n areas, and if the new area be an area enclosing the n areas, then there is not any one of the four colours available for the new area.

The theorem, if it is true at all, is true under more stringent conditions: for instance, if in any case the figure includes four or more areas meeting in a point (such as the sectors of a circle), then if (introducing a new area) we place at the point a small circular area, cut out from and attaching itself to each of the original sectorial areas, it must according to the theorem be possible with four colours only to colour the new figure; and this implies that it must be possible to colour the original figure so that only three colours (or it may be two) are used for the sectorial areas. And in precisely the same way (the theorem is in fact really the same) it must be possible to colour the original figure in such wise that only three colours (or it may be two) present themselves in the exterior boundary of the figure.

But now suppose that the theorem *under these more stringent conditions* is true for n areas: say that it is possible with four colours only, to colour the n areas in such wise that not more than three colours present themselves in the external boundary: then it might be easy to prove that the $n+1$ areas could be coloured with four colours only: but this would be insufficient for the purpose of a general proof; it would be necessary to show further that the $n+1$ areas could be with the four colours only coloured *in accordance with the foregoing boundary condition*; for without this we cannot from the case of the $n+1$ areas pass to the

next case of $n + 2$ areas. And so in general, whatever more stringent conditions we import into the theorem as regards the n areas, it is necessary to show not only that the $n + 1$ areas can be coloured with four colours only, but that they can be coloured in accordance with the more stringent conditions. As already mentioned, I have failed to obtain a proof.

GEOGRAPHICAL PROFESSORSHIPS AT OXFORD AND CAMBRIDGE.

IN June, 1874, the Council of the Royal Geographical Society addressed, through their President, Sir Bartle Frere, a Memorial to the Vice-Chancellors respectively of Oxford and Cambridge, urging the claims of Geographical science to due recognition in any future distribution of Academical Revenues, and pointing out the expediency of establishing a Professorship of Geography and founding Travelling Scholarships.* As was stated in the Memorial, no decisive reply was expected until the Royal Commission appointed to investigate Academical revenues should have made its report. This time, it is believed, is now drawing near, and the Council have therefore renewed its application, in the form of a second Memorial, addressed to the Commissioners, and also to the governing bodies of each University. The Memorial, with covering letter, signed by Sir Rutherford Alcock as Vice-President, was despatched on the 28th of February last. It runs as follows:—

While the organisation of Academical studies is under the consideration of the Oxford and Cambridge University Commissions, the Council of the Royal Geographical Society avail themselves of the opportunity thus afforded to urge on the Commissioners, as well as on the Governing Bodies of both Universities, the importance of establishing Geographical Professorships. The claims of Geography to be thus represented appear to the Council to be both weighty and numerous. They are briefly set forth in the following Memorandum.

The Council desire the word Geography to be understood in its most liberal sense, and not as an equivalent to topography. They mean by it, a compendious treatment of all the prominent conditions of a country, such as its climate, configuration, minerals, plants, and animals, as well as its human inhabitants; the latter in respect not only to their race, but also to their present and past history, so far as it is intimately connected with the peculiarities of the land they inhabit.

A Scientific Geographer does not confine himself to descriptions of separate localities, such as may be found in gazetteers, but he groups similar cases together and draws those generalisations from them to which the name of "Aspects of Nature" has been given. He studies the mutual balance and restraint of the various forms of vegetation and of

* Printed in 'Proceedings R. G. S.,' vol. xviii. p. 451.

animal life under different local conditions, and he gathers evidence from the Geographical conditions of the present time, on the character of those that preceded and gave rise to them. Among the many classes of problems that fall under these heads, it is sufficient to specify two. The one deals with the reciprocal influence of man and his surroundings; showing on the one hand the influence of external nature on race, commercial development and sociology, and on the other, the influence of man on nature, in the clearing of forests, cultivation and drainage of the soil, introduction of new plants and domestic animals, and the like. The other problem deals with the inferences that may be drawn from the present distribution of plants and animals, in respect to the configuration of the surface of the earth in ancient times. Thus we see that the mutual relation of the objects of the different sciences is the subject of a science in itself, so that Scientific Geography may be defined as the study of local correlations.

Geography, thus defined, does not tend in any degree to supersede the special cultivation of the separate sciences, but rather to intensify the interest already felt in each of them, by establishing connections which would otherwise be unobserved. It is through Geography alone that physical, historical, and political conditions are seen to be linked closely together; and it is thus that Geography claims the position of a science distinct from the rest, and of singular practical importance.

It may perhaps be objected that Geography in this sense is too wide a subject and that its limits are too uncertain to justify its recognition at the Universities by a special Professorship. Precisely the same objections might however be urged against a Professorship of History, yet in that case no one seriously entertains them. A practical answer to any objection against founding a University Chair of Geography is that Professorships have already been established with excellent results in many places on the Continent. A Professor of Geography has existed in the University of Berlin since the days of Carl Ritter; similar Professorships are established at the Universities of Halle, Marburg, Strasburg, Bonn, Göttingen, and Breslau. In Switzerland they are established at Geneva, Neuchâtel, and Zurich. In France, Geographical Chairs, under the control of the University of France, are attached to the *Facultés des Lettres* at the following towns—Paris (Sorbonne), Bordeaux, Caen, and Lyons; at Clermont-Ferrand and Nancy the Chairs of History and Geography are united; at Marseilles a Professorship of History and Commercial Geography is attached to the *Faculté des Sciences*. There are, therefore, in all seven Chairs of Geography in France endowed by the State. This provision is of course supplementary to the instruction given in the *Lycées*, which is of a high class and corresponds to that which the Royal Geographical Society has during the last ten years endeavoured to encourage in our leading public schools by their annual examinations and prize medals.

The duties of such a Professor as the Council desire to see appointed would be, first, to promote the study of Scientific Geography as defined above; and, secondly, to apply geographical knowledge in illustrating and completing such of the recognised University Studies as require its aid.

The claims of Geography to occupy a central place among the physical sciences, which already form an important part in University studies, can hardly be questioned, and since the introduction of more liberal methods of teaching into the classical and historical schools, its position in respect to these is little less essential. It may be broadly affirmed that questions are set in every examination in these schools which cannot be adequately answered without considerable knowledge of the higher Geography, and in the list of subjects for Prize Essays proposed at Oxford during the last twenty-five years, the importance of such knowledge is amply recognised.

It should be further remarked that while the facilities for travelling have widely extended, and although the number of young men who travel after leaving the Universities, for the sake of supplementing their education, is increasing every year, very few of them are qualified to make an intelligent use of the information which they may or might obtain, and still fewer are qualified to make observations of the least scientific value. The same can be said, with little qualification, of the much smaller number who go out as Missionaries, and who often enjoy special opportunities of collecting new evidence, not merely on Geographical questions but on questions of ethnological and philological interest. Such persons, if previously trained under an able Professor at a University, would form a most valuable corps of scientific observers. The literary results of German travel at the present day, seem to show that the educational advantages which are attainable in Germany have borne fruit in developing and directing the powers of observation in German travellers.

A University Professor would probably so arrange his lectures as to fall in with the general course of studies at the Universities, adapting one part of them to students of history, and another to students of physical science. He would also perhaps deliver at least one annual discourse on some subject of original Geographical research.

The establishment of a Professorial Chair, and the example and scholarly writings of a University Professor, would give a much-needed impetus to the progress of the art of teaching Geography in schools and elsewhere, which is at present imperfectly developed, and for which the existing text-books are avowedly inadequate. It appears that of all the subjects handled by those graduates of Cambridge who hold the office of lecturers in the great provincial towns, in connection with the Cambridge University Extension scheme, none has been so popular as Physical Geography. A supply of such lecturers, who had been well

instructed by a University Professor of Geography, would therefore confer a real benefit on the education of the country, and one that would be widely appreciated.

A copious collection of maps, models, pictures, and ethnological illustrations of the various lands which are the theatres of historical study, would gradually accumulate under the charge of a Professor of Geography and would enable him to illustrate their configuration and scenery as well as the social character of their inhabitants, with a fullness that no ordinary teacher could hope to rival. Such illustrations, it may be remarked, are consistent with the general tendency of modern instruction.

It might be thought advisable to entrust the proposed Professors with some special duties in respect to the collection of Geographical publications in the University libraries, so as to ensure that these stores of knowledge should be easily available in any emergency, when facts relating to some half-forgotten country are earnestly desired by the public. We may be sure that under such circumstances their comments would be awaited with interest and listened to with respect.

In conclusion, the Council would strongly urge that there is no country that can less afford to dispense with Geographical knowledge than England, and that, while there is no people who have a greater natural interest in it (as shown by the large support received by the Royal Geographical Society), there are few countries in which a high order of Geographical teaching is so little encouraged. The interests of England are as wide as the world, and it would not be difficult to cite instances in which these interests have been seriously compromised by a want of Geographical knowledge. The colonies of England, her commerce, her emigrations, her wars, her missionaries, and her scientific explorers bring her into contact with all parts of the globe, and it is therefore a matter of imperial importance that no reasonable means should be neglected of training her youth in sound Geographical knowledge.

THE PROPOSED AFRICAN OVERLAND TELEGRAPH.

As our readers were informed in the February number of the 'Proceedings' (p. 124), the Conference on the subject of the feasibility of a line of telegraph through Africa, which met in July 1877, held its last meeting * at the rooms of the Society on the 6th of January, 1879, and agreed to a Report, the draft of which was submitted by Sir Rawson W. Rawson. This Report formed one of the documents sent to the Secretary of State for the Colonies, in answer to the request for

* The meeting was attended by Sir H. C. Rawlinson, Sir Henry Barkly, Sir Rawson W. Rawson, Sir Frederick Goldsmid, General Rigby, Mr. S. W. Silver, Sir S. Canning, and Mr. Sabine.

information made by him in October last. We now place the Report before our readers :—

REPORT OF A CONFERENCE HELD AT NO. 1, SAYILE ROW, TO CONSIDER THE FEASIBILITY OF A LINE OF OVERLAND TELEGRAPH THROUGH AFRICA, TO CONNECT THE LINES IN SOUTH AFRICA WITH THOSE OF EGYPT.*

THREE overland routes have been suggested, of which two follow the same course, from Alexandria, up the Nile, to Unyanyembe, south of Lake Victoria, where they diverge—one taking a more westerly course, through Ujiji, across Lake Tanganyika, past Lake Bangweolo, to the Zambesi, which it would strike at or near the Victoria Falls, and thence proceed through Shoshong to Pretoria or Kimberley; the other proceeding to the head of Lake Nyassa, and thence down one or other side of the lake to the Zambesi, either down the River Shire, or in a south-westerly direction to Tete. The first has been called the “West Central” line, the second the “East Central” line. The third, called the “Coast” line, coincides with the second line from Pretoria, northward to the east side of Lake Nyassa; but there, instead of striking north-west to Unyanyembe and Lake Victoria, it turns to the coast and follows it either to Zanzibar, where it would be taken west to Unyanyembe, or north, along the coast to the extremity of the dominions of the Sultan of Zanzibar, and thence either by land through the Somali country to the coast opposite to Aden, or still along the coast to Cape Guardafui, from either of which termini, or from the starting-point, it would be taken by submarine cable to Aden.

It has appeared preferable to adopt the “East Central” line for the following reasons :—1. It follows the course of the Nile up to Lake Victoria, one-fourth of the whole distance, and the Egyptian Government undertakes to erect it,† and will be able to protect it, up to Mtesa’s territory. 2. It opens up the chain of lakes from the Nile to the Zambesi, on all three of which Europeans have already established one or more settlements, which will by this means be brought into communication with Great Britain. On two of these lakes steamers have already been placed; thus they afford water communication for many hundred miles, and facilities for transporting, and forming dépôts of, materials. 3. It is the most direct, shortest, and least expensive line to Pretoria, consistent with deviations which it has been judged advisable to adopt for the purpose of securing facilities of construction and the accession of future business. 4. It has, for the greater part, been traversed by one or more travellers, and it will doubtless be the route by which commerce and attendant civilisation will first penetrate the continent.

The “West Central” line, as far as it varies from the above, presents

* The minutes of the first meeting of the same Conference, held on 8th July, 1877, were published in the ‘Proceedings’ for that year, vol. xxi. p. 616.

† On the authority of Mr. Giegler.

the disadvantage of passing more to the centre of the continent, through a country unexplored and not likely to be settled until long after the preceding route, and presenting increased difficulties of transport and subsequent protection.

The "Coast" line, after leaving Zanzibar, is wanting in all the recommendations of the East Central line. It may connect the Arab traders—too often slavers—on the coast with Zanzibar, but they have no communications with Europe or South Africa. It would not tap the interior; it would not serve the missionary and other establishments formed and forming on the line of lakes, and for 1100 miles beyond Mombasa it would pass through a country unexplored, but, throughout more than half of it, known to be occupied by a population hostile to Europeans, and offering no inducement to them, either of present trade or channels for future enterprise. It would, moreover, require a cable across the Gulf of Aden, a distance of about 160 miles.

The above reasons have led to the confident selection of the "East Central" line. It is proposed to run a line from Khartum on the Nile—to which point existing lines already extend—to Gondokoro, which is also on the Nile, in lat. $4^{\circ} 54'$ N., 645 geographical miles from Khartum. The next section is from Gondokoro to Lake Victoria, at the head of which is Mtesa's capital, where a station of the Church Missionary Society is established, a distance of 300 geographical miles.

From Mtesa's the line may be easily carried round the west side of Lake Victoria, through Karagwe and the territories of Rumanika, where a missionary station will probably be established, and, under the protection of the two chiefs, to some point on the south side of Lake Victoria; or it may pass on to Serombo, in the territory of Mirambo, who will protect it a considerable distance towards Unyanyembe. The length of either route is also 300 miles.

The most advantageous line then appears to be south to Unyanyembe, a distance of 130 geographical miles, whence branches may be carried, along well-trodden caravan tracks, to the coast opposite Zanzibar, eastward, a distance of 370 geographical miles, and westward to Ujiji, on Lake Tanganyika, where the London Missionary Society has formed a station, a distance of 180 geographical miles.

From Unyanyembe a choice of four routes presents itself. Two may be at once dismissed. Of these one would proceed by Ujiji, either down or across Lake Tanganyika to Lake Bangweolo, and thence to the Zambesi, at or near the Victoria Falls. This is the "West Central" line, which has been already noticed. The second would proceed by Ujiji and Lake Tanganyika to the northern end of Lake Nyassa; but as this route would be double the length of a direct line from Unyanyembe to the same point, it need not be discussed.

Two other lines have competing merits—one from Unyanyembe direct to Lake Nyassa, across a country which Mr. H. M. Stanley describes as "almost unknown, though by no means impassable," a

distance of 300 geographical miles; the second from Unyanyembe to Mwapwa and Zanzibar, and thence either from Mwapwa or Zanzibar direct to the same point as the last, on Lake Nyassa. This will be twice as long, but it will connect Zanzibar with Europe, India, and South Africa, and will so far extend a line of telegraph towards Mauritius as probably to decide the route by which the connection of that island with Europe should be completed, and to entitle the Company to some share of the subsidy offered by that island. On the southern half of this section an alternative line presents itself, viz. down the coast from Zanzibar to Port Lindi, and thence through stations of the University Mission, and by a frequented track to the centre of Lake Nyassa. This requires further examination.

From the north of Lake Nyassa, where it is expected that a mission station will be established, the line might run down either side of the lake to Livingstonia, a station of the Scotch Mission, on the south-west end of the lake, which by the eastern side is a distance of 300 geographical miles. From this point it might either follow the River Shire to the Zambesi, a further distance of 240 miles, or might be carried south-west to Tete, 155 miles higher up the Zambesi, at a distance of 145 miles from Livingstonia. It may be found desirable to include the missionary station, Blantyre, on the River Shire, in this section. Further inquiry is necessary.

From the mouth of the Shire direct to Pretoria the distance is about 650 geographical miles, and from Tete, via the Tatin gold-fields, to Pretoria is 750 miles. If extended to Shoshong, Khame's settlement, it would be 820 miles. The direct road is at present scarcely practicable, as it passes through tribes which are now in active hostility against the Government, while the longer route passes through a country, much of which has been surveyed, and through native settlements which are on the well-frequented path of traders.

The aggregate of these several sections in a direct line is approximately as follows:—

	Geographical Miles.
1. Khartum to Gondokoro	645
2. Gondokoro to Mtesa's capital	300
3. Mtesa's to south side of Lake Victoria	300
4. Lake Victoria to Unyanyembe	130
5. Unyanyembe to Bagamoyo	370
5a. Bagamoyo to Zanzibar	35
6. Bagamoyo to north of Lake Nyassa	290
7. Down Lake Nyassa to Livingstonia	300
8. Livingstonia to Tete	145
9. Tete to Pretoria	820
	<hr/>
	3335
To which must be added for deviations, say about one-fifth, viz.	667
	<hr/>
Making in all	4002

geographical miles, or rather less than the length of a submarine cable from Aden to Port Natal.

From Pretoria to Pietermaritzburg, which is the present terminus of the line from Cape Town, is 240 miles, and it is understood that steps have been already taken to extend the Cape line to the former point. Should this not be the case, it may be confidently expected that if a company be formed to construct a line from Khartum to Pretoria, Her Majesty's Government will lose little time in employing it to connect Pretoria with the Cape, by Pietermaritzburg; and while the better known and more easy portions of the line are under construction, time will be afforded for prospecting and laying out the unexplored and more difficult sections.

With regard to the practicability of such a line, the letters of Captain Cameron and Mr. H. M. Stanley, appended to this Report,* furnish ample testimony, which is further confirmed by the recorded testimony of Livingstone, and by the personal experience of Lieut.-Colonel Grant, and the several missionaries who have penetrated into these parts. Captain Cameron writes: "As far as the country itself goes, I can see no difficulty whatever in the line of telegraph from north to south through Africa." He adds: "It would be an immense step in opening up the country." Mr Stanley writes: "From Unyanyembe to Mtesa's" (the 3rd and 4th sections) "the construction of the line would not be difficult, as by tactful liberality the assistance of the chiefs would be secured; working men would be easily procurable, and food is abundant." The only part of the line which has hitherto been unexplored is between Zanzibar and the head of Lake Nyassa, which Mr. Keith Johnston has just left England to survey, under the auspices of the African Exploration Fund Committee of the Royal Geographical Society. The distance is only 290 miles. But if no insurmountable difficulty was found in running a line from north to south across Australia, a distance of 2000 miles, in two years, through a country the greater part of which was unexplored, and the character of which was known to be attended with difficulties which will not be experienced in Africa, and if the average cost of that line was only 200*l.* a mile, the project now under consideration is a comparatively easy and inexpensive one.

From the recent experience of Gordon Pasha, it is probable that the introduction of a few Indian elephants, with their drivers, might materially facilitate the transport of material. It appears that Africans readily learn to manage those animals, and it might, in consequence, be expected that the subjugation of the African elephant would soon follow, to the great advantage of commercial intercourse, especially in regions infected by the "Tsetse" fly, and in those that are covered with tall grass not easily penetrated by men on foot.

True it is that Sir S. Baker, in his letter (Appendix C), is deterred by the difficulties which he foresees, and advocates a coast line. But he

* Appendices A and B. The appendices here and subsequently referred to, are too voluminous for publication in the 'Proceedings'; they may be perused in the original Report in the Society's library.

evidently contemplates a submarine cable from Aden to Zanzibar, which is open to the financial objection attaching to all submarine cables, and presents none of the advantages attendant upon carrying the line through Egypt. His objections, as far as Egypt is concerned, are met by the letter of Mr. Giegler, the Director of the Soudan and Red Sea Coast Telegraphs, in Appendix D, and as regards the rest of the line, by the concurrent favourable opinion of all the writers in the annexed correspondence.

Messrs. Cameron and Stanley differ considerably as to the amount which it will be necessary to expend in subsidising the chiefs. The experience of the Persian and other lines will afford some guide in this matter; while that of all travellers in South Africa preceding Stanley affords reason to believe that the lower estimate of Cameron is much nearer to the mark. It is stated that the subsidy granted in Persia is 4*l.* a mile. It is Colonel Grant's opinion that a fourth of that amount would satisfy an African chief. Cameron suggests 10*s.* to 15*s.* a mile. At double the highest amount this charge for 2000 miles would only amount to 4000*l.* a year, which is only a third of the cost of maintaining a steamer for the repair of a submarine cable.

With respect to the first two sections through Egypt from Khartum to Mtesa's capital, Mr. Giegler writes:—"I have every reason to believe that the Egyptian Government would heartily support the project of a land line to the Cape; and Colonel Gordon, with whom I have frequently discussed the matter, told me as much, that he would undertake to construct a line up to the frontier of Uganda if the materials are supplied by a company and delivered at Berber. The Egyptian Government would then charge the same rate for messages from Khartum to that point as it charges from Khartum to Cairo; it would also supply a staff and armed porters. Beyond the frontier of Uganda the Company would have to supply materials and make line."

Mr. Giegler effectually dispels the imaginary objection arising out of the difficulty of carrying and maintaining a line of telegraph poles through a marshy and semi-tropical country; and he bears the strongest testimony, founded upon experience, to the disposition of the natives not to impede or interfere with the construction or maintenance of telegraphs, and other works carried on by Europeans. The remarks which he makes regarding the change that has taken place within a recent period in Upper Egypt, apply to the whole chain of lakes, in which districts the presence of travellers and missionary parties (navigating steamers on no less than three of the lakes) has smoothed the way for other similar enterprises. Upon this point, which is of primary importance, viz. the immunity of telegraph lines from the attacks of the natives, either during construction or afterwards, the evidence is conclusive, uniform, and perfectly satisfactory.

Sir Frederick Goldsmid, in his volume on 'Telegraph and Travel,' speaking of the land lines in Persia, over 1800 miles, states: "Upon

the whole, the experience of after years" (about ten) "amply proves that with the good-will of the local governors, telegraph posts and wires may be kept in Persia as secure from wilful injury as in civilised Europe." Colonel Stewart, who was employed on the same service, writes: "The fact of the wire being galvanised not only detracts from its value very much for all purposes, involving the welding or working up of the metal, but also provides a certain means of identifying it at a glance if found in the possession of anyone. . . . I doubt whether insulators present the smallest temptation, or could possibly be used in any other than the legitimate way." Major Champain, also employed on the Persian lines, states (Appendix E): "The natives of Persia can scarcely be called an uncivilised race, but I am not sure whether we should not, when we first commenced operations in that country in 1863, have preferred to deal with absolute barbarians. . . . In the more uncivilised parts, such as the Makran coast, our telegraph is never touched." Sir H. Barkly states that in the late Kafir war the natives never attempted to interfere with the telegraph. Major Champain's letter and the replies of Sir F. Goldsmid to certain questions contained in Appendix F, present much useful information, especially as to the terms upon which protection was obtained for the line from the local authorities.

In further confirmation, and in proof of the security of land lines of telegraph, reference is made to Appendix G, which contains an extract from a report of the minutes of a conference on this subject held by several of the leading members of the Council of the Royal Geographical Society.

With reference to the line now proposed, it must be noticed that Sir Bartle Frere, the present Governor of the Cape Colony, suggests in his letter (Appendix H), that a "continuous series of short lines, connecting the chief ports on the coast with each other, are likely to pay better than one long line through the centre of the 'Dark Continent';" and Dr. Kirk, Her Majesty's Consul-General at Zanzibar, in his letter (Appendix I), proposes a similar line along the coast from Zanzibar north to Cape Guardafui and Aden. The object of both these eminent authorities is to offer facilities to traders on the coast, and so to develop fresh sources of commerce. But, as has been before observed, it appears pretty certain that, with the action of the missionary and other societies already in the field, and with the assistance of a telegraph, the inland lakes of Eastern Africa present the most favourable opportunities for developing commerce and benefiting the people of Central Africa; that new ways of access from the coast to the lakes will be successively and rapidly opened up; and that when the overland telegraph reaches Zanzibar and Natal, those two ports will very quickly be united by a coast line, unless the nature of the country should present difficulties which would render its adoption equally objectionable for the present purpose.

Appendices K and L are letters from Dr. Guybon Atherstone, whose reputation as a man of science and patriotic energy commands respect for his opinion, suggesting the "West Central" line already described, from Kimberley, in Griqualand. But, in addition to the objections already stated to that line, the annexation of the Transvaal, and the importance of carrying the line through Pretoria to Natal, are grounds for preferring the more eastern line. His letter, however, contains much information and several useful suggestions.

Mr. Stanley, in his letter already quoted, recommends the line now proposed. He objects to an extension to Zanzibar, but chiefly on the ground that it will be provided with an ocean line, which is not at all probable if an overland line be constructed. His estimate of all expenses of construction, exclusive of materials, from Nyassa to the Egyptian frontier (1300 miles), is under 55*l.* a mile, but as it omits some important items, and as it seems to be excessive in others, it will serve only to indicate some sources of outlay which he considers to be necessary.

Mr. Sivewright, the General Manager of Government Telegraphs, Cape of Good Hope (Appendix M), is strongly in favour of an overland line, and inclines to the opinion that it should be carried from Pretoria to Tete, and up Lake Nyassa to Zanzibar, and thence to Lake Victoria and Gondokoro. He believes that the route from Tete to Zanzibar is already fairly well known.

Mr. Thomas Watson, in his letter (Appendix N), indicates the views of one of the leading merchants at the Cape. He is President of the Chamber of Commerce, a member of the Cape House of Assembly, and president of a committee of most of the leading merchants in Cape Town, formed to give a practical effect to the question of an overland line. His personal representations show that his views prevail to a great extent among the most prominent members of the Cape community.

The remaining Appendices, O to O³, contain a despatch from Sir Bartle Frere, the Governor of the Cape, enclosing a report and address of Mr. Sivewright, the General Manager of Government Telegraphs, Cape Town, and an article from the 'Cape Argus,' referred to in Sir Bartle Frere's despatch. These documents have only come before "The Conference" since their Report was written. They confirm so entirely all that has been stated in the Report, as regards both the comparative merits of an overland and submarine line, and the most advantageous route to be taken, that if they had been received sooner, "The Conference" might have adopted the address as the text of their own Report, and have only referred to the correspondence in confirmation of the several statements and arguments contained in it.

[The Report concludes with estimates of the cost of construction and maintenance and of receipts, which are omitted, as not coming within the province of the Society.]

GEOGRAPHICAL NOTES.

The Portuguese African Expedition.—Success has attended the efforts of one section of the important Expedition despatched in 1877 by the Government of Portugal to explore the unknown regions bordering on their African possessions. Major Serpa Pinto has telegraphed to the King of Portugal announcing his arrival at Pretoria, in Transvaal, after an eventful march across the interior in a south-easterly direction from Benguela. He gives the satisfactory assurance that he has brought safely through all the perils of his journey—floods, deserts, and hostile natives—the whole of his charts and observations, which include the results of a “complete exploration of the Upper Zambesi and the solution of the problem of the Cubango.” This latter announcement will be certain to excite the interest of Geographers, as it seems to indicate that Senhor Pinto has traced the important River Cubango down to its junction with the Chobe, and proved it to be, as Andersson and Baines supposed, the main branch of the Zambesi. The Cubango collects the drainage of a wide extent of the Benguela highlands, its basin lying between that of the Cunene on the west, and that of the Leeba of Livingstone (generally given on maps as the main Zambesi) on the east. The Cubango lay wholly to the west of Livingstone’s line of march in his famous journey to Loanda; and it is marked on the best maps of the last twenty years, variously, as flowing to the Cunene, to inland lagoons in the desert region of Ngami, or to the Chobe. Cameron passed very near its headwaters in approaching Bihé from the east. Part of its upper course has been made known by the visits of Portuguese traders, and is traced on Sá da Bandeira’s map of Angola down to latitude 17° S. It was struck by Mr. C. J. Andersson on his expedition of 1859 in lat. $17^{\circ} 47'$ S., long. $18^{\circ} 51'$ E.,* and navigated by him both below and above this point for about 100 miles; it is here called the Okavango; but the ultimate destination of its copious waters, here flowing in a bed from 200 to 300 yards wide at a rate of $2\frac{1}{2}$ or 3 miles per hour, has remained until now unknown. Senhor Pinto, as we informed our readers in the February number of the ‘Proceedings’ (p. 130), separated from his companions at Bihé with the intention of proceeding eastward towards Zumbo, on the Zambesi. His journey south-eastward to Transvaal from the Zambesi would of course take him through country tolerably well known to Geographers.

Another Portuguese expedition on a much smaller scale has recently been engaged on a survey of the lower course of the Cunene. It was composed of the naval officers, MM. Lima, Queriol, and Silva. Landing in Tigres Bay, the officers, with numerous attendants, marched over high

* ‘Journal R. G. S.’ vol. xxxvi. p. 247.

sandhills to the Cunene, and suffered much from fatigue and thirst. The work was accomplished between the 30th of November and the 19th December last.

The Belgian African Expedition.—This important expedition, organised by the International Association at Brussels, has lost another of its leaders through the effects of the climate. The Belgian agent at Aden a few days ago telegraphed that "Lieutenant Wauthier had died of dysentery at Hekungu, near Lake Chaia, on the 19th December." The untimely end of this devoted and zealous officer, who it will be remembered was one of the two sent out to take the place of MM. Crespel and Maes, deceased at Zanzibar, has caused sincere regret among the members of the Association.—The Lake Chaia (or Chaya) here mentioned is a small lake some 80 miles south-east of Tabora in Unyanyembe. It is not marked on any of the maps of our great explorers, but is mentioned in recent communications to the Church Missionary Society, as the place near which Mr. Penrose was murdered. Curiously enough, this event occurred nearly at the same time as Lieutenant Wauthier's death.

The Rev. Thomas Wakefield, of the Ribé Mission near Mombasa, is now on his return to England, after his second long sojourn in Eastern Africa which has extended over a period of eight years. Mr. Wakefield is a keen geographer, and has, no doubt, made good use of his opportunities during the journeys in the Galla country which have occupied the later years of his stay, in obtaining information about that little-known region, and thus supplementing the map and itineraries which he presented to the Society in 1870.* Among the stores of new material he is bringing home, we hear of a manuscript volume of routes in the Somālī country, with full descriptions and carefully drawn maps; one of these routes passing straight through the interior of Somāliland, from Brava to Berbera on the Gulf of Aden.

Survey of the Sanpu River of Tibet.—The Sanpu, or great river, of Tibet, which rises in the vicinity of the Mariam-la Pass, in the province of Nari, and flows eastward to emerge, after a sharp curve, in the valley of Assam, under the successive names of Dihong and Brahmaputra, has at length had its identity with the last-named river placed beyond doubt. One of Colonel Walker's indefatigable native explorers has traced and surveyed the great river downwards for 200 miles beyond Chetang, the furthestmost eastward point to which it had hitherto been followed. Beyond the point attained by the explorer the river turned southwards into some hills which he was unable to penetrate. A glance at any recent map of Asia will show that the true direction and course

* See Journal, vol. xl. p. 303.

of the river has been accurately divined by modern geographers, but it is satisfactory to have the identity of the two rivers placed beyond doubt, and Klaproth's elaborate hypothesis of the Irawaddy being the lower course of the Sanpu, and Colonel Godwin Austen's suggestion regarding the Subansiri, finally disposed of. A gap still remains to be explored between the lowest point reached by the present explorer and Wileox's highest point up the Dihong. As in this comparatively brief stretch the river descends 8000 feet, if not more, the interval must include some grand developments of fluvial topography.

The New Route to Candahar.—The successful opening of the so-called "Temple" route from the coast to Kelat and Candahar is an event of very great importance, as by this means these cities are rendered directly accessible from the sea; the distance from the coast to Kelat being thereby reduced to 237 miles. Sonmiani Bay, the starting point of the road, is not a good harbour at the best of times, and during the south-east monsoon it is almost unapproachable. It may however be reached from Karachi by the land route, which is only about 50 miles long. Northwards of Sonmiani the road is fairly good, with one or two exceptions. It passes through Uthal, where dwell plenty of British subjects, and in the neighbourhood of which supplies are plentiful. Bela, once a large town, is now thinly populated, but it is nevertheless the chief trade entrepot, and the surrounding country exports considerable quantities of grain. The chief difficulty of the Sonmiani route is the Barun Luk Pass, about 120 miles north of the sea-coast, and the elevation of which is about 3380 feet. Over this pass, however, a battery of horse artillery was taken in 1841, so that engineering skill may not improbably make it quite practicable. The new route, completely turning, as it does, the lengthy road through the Bolan, is of obvious importance, and it will become a powerful factor in the question of our future occupation of Afghanistan.

Lighting of Indian Coasts.—A new and improved list of the lighthouses and light-vessels in British India, including the Red Sea and coast of Arabia, extending altogether from Suez to Singapore, has recently been published at Calcutta in connection with the Marine Survey Department. This most useful production is one of the many pieces of good work which owe their existence to the organisation of that department. Mr. R. C. Carrington, the compiler, has been at considerable pains to obtain all the necessary particulars regarding the different lights, which are described under the following heads:—Name, location, latitude and longitude, colour and characteristics of light, radius of visibility, arc of illumination, construction of lighthouse, height, and a few other details. The list includes even two lights which were started as recently as the 23rd and 15th January, 1879, viz. the Goapnath light in the Gulf of Cambay, and the Coeonada light intended to lead vessels clear of the shoals north of Godavery Point. The price

of this little handbook is only one rupee, and it is altogether an indispensable aid to navigation.

M. Charnay's Researches in Java, &c.—M. Désiré Charnay, the well-known archæological explorer of Yucatan, Southern Mexico, and Madagascar, is now engaged on a scientific mission in the Eastern Islands and Australia. In the Reports which he has sent to France on his labours in Java during the months of July and August of last year, he states that he has explored the eastern and western portions of the island, and recognised a close analogy between the great epochs of Buddhist civilisation in the Sunda Islands and those of ancient Mexico. He is strongly impressed by the crowded population of Java. Though the inhabitants live in the shelter of forests and appear to be lost in immense parks, the population far exceeds in density per square mile that of the most populous countries of Europe. M. Charnay arrived in Melbourne at the end of last September, and intends to pass some time in Australia. He has established two stations at Cooktown and at Thursday Island in Torres Straits, with the view of forming a collection of objects of natural history and ethnology.

Japanese Colonisation in Yesso.—In his last Report to the Foreign Office, Her Majesty's Consul at Hakodate gives some account of what is being done at Sapporo in this island by the "Kaitakushi," or Colonisation Department. Seven years ago there was not a house on the present site of Sapporo, the ground being covered with a large and stately forest. In its stead there is now a rising town, which is laid out in broad and straight streets crossing each other at right angles. The houses, already numbering nearly 800, are mostly built in the Japanese style, except the offices of the Kaitakushi and the other public buildings. A rapid mountain stream, named the Toyohira, runs through the centre of Sapporo, and furnishes through a canal ample water-power for a number of factories, as well as an abundant supply of water for the town and for irrigation purposes. Of the public institutions of Sapporo, the most remarkable is the Agricultural College, which was founded by the Kaitakushi for the education and practical teaching of young men from all parts of the empire. Candidates for admission are examined, orally and in writing, in the Japanese and English languages, arithmetic, geography, and history. The course of instruction at the College is intended to occupy four years, and to include, besides the Japanese and English languages, agriculture and horticulture, civil engineering and chemistry, astronomy, botany, geology, zoology, and other sciences. Among the industrial enterprises which are being carried on at Sapporo, the saw-mills are the oldest; they comprise a steam saw-mill, a water-mill, planing, tonguing and grooving machines, &c. Every description of furniture is manufactured according to foreign models, and well-made, substantial articles can be purchased there more cheaply than in England. A silk factory, a brewery, and a

tannery are also in active operation. Great attention is paid to the breeding of horses, cattle, sheep, and swine, for which immense stables have been erected. Great praise and credit are due, in Mr. Eusden's opinion, to the native and foreign officials for all that has been accomplished at Sapporo, but the geographical position of their activity and industry appears to be an unfortunate one. Communication with the outer world has to be made by water via Otaru, or by land via Mororan and Hakodate; for the Iskari River, though it is one of the largest in Japan, being some 700 feet wide and 20 feet deep, has several constantly shifting sandbanks at its mouth, and is consequently useless for harbour purposes. Otaru is 21 miles distant and is not a good port, so that the land-route is the only one really available. A new road has recently been made which, it is hoped, will facilitate communication. From Hakodate it leads with an easy gradient over the Togonasta Pass, which used to be a very fatiguing ascent, and thence on to Mori. Volcano Bay is crossed by steamer or junk, and from Mororan to Tomacomai the road passes along the sea-coast, and then across a swampy forest to Chitose. From that point the country becomes more interesting, being densely wooded, with rather attractive scenery in some places.

M. Raffray's Explorations in New Guinea.—This enterprising and successful naturalist traveller, who had already done good service in Abyssinia, in 1876 undertook, in company with M. Maindron, of the Jardin des Plantes, a scientific mission to New Guinea under the auspices of the Minister of Public Instruction. On his way thither he spent some time in Java and the Moluccas, and visited the islands of Ternate, Tidore, and Gilolo. In New Guinea his investigations were confined to the northern part of the island. He visited the Arfak tribes in the Dorei-Andai peninsula, and penetrated to Amberbaki in the interior, at which place and in several islands of the Misori group he made important collections. At the meeting of the Society of Commercial Geography at Paris on February 22nd, M. Raffray gave some details respecting his travels. He remarked that the inhabitants of New Guinea are negroes, but differ much physically from those of Africa, their nose, instead of being flat and broad, being perfectly aquiline; that they are cannibals, and are of eager, covetous disposition. In the course of his journeys into the interior, M. Raffray had numerous difficulties to surmount, arising chiefly from the hostility of the natives and from the greediness of his guides, whom he was often unable to retain except by the bait of a large reward. In order to get some hold upon one of them, he was even obliged to divide his journey into several stages, and only to pay the man when a stage was entirely completed. He was more than a year in the country, and the collections which he made are now deposited in the Museum d'Histoire Naturelle at Paris. In a report which he sent home respecting these investigations, he notes that one of the most remarkable characteristics of the fauna of the Moluccas

is the restriction of species to each separate island; thus the insect and bird-faunas of Ternate, Tidor, and Gilolo, are represented, in each, by species allied but completely distinct, although the islands are close to one another.

North-Western Australia.—Mr. Alexander Forrest, brother to the well-known explorer Mr. John Forrest, has been recently despatched, by the Government of Western Australia, on a journey of exploration and survey to the hitherto unexamined part of the country lying between the De Grey and Victoria rivers, i.e. between $26^{\circ} 20'$ and 15° S. lat., and 119° and $129^{\circ} 20'$ E. long. The party consists of five Europeans, besides the leader and two natives. The exploration is expected to occupy about six months, and may be extended to the overland telegraph line and Port Darwin if the leader thinks fit. The party started on the 18th of January last.

Obituary.

Captain John Septimus Roe, R.N.—Captain Roe, one of the pioneers of Australian exploration, died at Perth, in Western Australia, on the 28th of May last, having reached the advanced age of eighty-one years. He was born at Newbury, in Berkshire, the seventh son of the Rev. James Roe, of the same place. After receiving his education at the Blue Coat School, he entered the Royal Navy as midshipman in June, 1813, being then fifteen years of age, and served through the various grades up to lieutenant, chiefly on the East India station; being almost uninterruptedly employed for upwards of fourteen years. During this period he saw his fair share of active service, having been through the Burmese war, 1825–7, and engaged at the siege of Ava. In December, 1828, he received the appointment of Surveyor-General for Western Australia, the duties of which he filled with eminent success, and to the satisfaction of all, Government and colonists, for the long period of forty-two years. He made the colony his home, and became a member of its Executive and Legislative Council.

The late Captain Roe was one of the first to land in the colony of Western Australia, having arrived at the mouth of Swan River with Captain (afterwards Admiral Sir James) Stirling, in the ship *Parmelia*, on the 1st of June, 1829, and he was present when the colony was established soon afterwards by proclamation. It fell to his duty to make all the preliminary surveys of harbours, anchorages, and approaches to Swan River, and it was on his reports that the sites were chosen for Fremantle, the sea-port town, and Perth, the capital of the colony. For many years afterwards he was occupied in explorations and surveys of the coast and the great unknown tracts in the interior. Thus in 1830 he examined the country about Leschenault, the rivers Collie, Ferguson, and Preston, Cape Naturaliste and Geographe Bay; in 1831 the south-western angle of the continent, visiting King George's Sound and the neighbouring places; in short, important work of this kind was accomplished by him almost every season until 1848–9, when he made the longer and more eventful journey from Swan River to the South Coast at Cape Pasley, and explored the desert tracts far into the interior, his narrative of which, illustrated by an excellent map by Arrowsmith, was published in the 22nd volume of our Journal. On this hazardous and trying journey he received serious personal injury, which incapacitated him for further active work in the field.

Our late Associate, besides being a skilled surveyor and explorer, was a man of intellectual tastes, and versed in other departments of science. He was a Fellow

the Linnean Society, and made during his journeys large collections in botany, zoology, and mineralogy; many a new species from that region so prolific of strange forms has been named after him. He founded a Public Museum and a Mechanics' Institute at Perth, and was for many years President of the latter institution. At his death a public funeral with military honours was accorded to him, and the *cortège* is described as one of the most imposing ever witnessed in Perth. Thus nobly do our colonists testify their respect for intellectual and moral worth in those who have lived amongst them.

REPORT OF THE EVENING MEETINGS, SESSION 1878-9.

Seventh Meeting, 24th February, 1879:—Sir RUTHERFORD ALCOCK, K.C.B., Vice-President, in the Chair.

ELECTIONS.—*Robert Berridge, Esq.; Mateo Clark, Esq.; Rev. Edward Augustus Davies; Henry Prinsep Fane, Esq.; William Dashwood Fane, Esq.; John Thomas Frederick Halligey, Esq.; Admiral Sir Astley Cooper Key, K.C.B.; Olé Peter Möller, Esq.; Major-General David John Falconer Newall; James Edward Singleton, Esq.; George Seaton, Esq.; Rear-Admiral Francisco S. Tremlett; Edward Wilkinson, Esq. M.A.*

THE CHAIRMAN expressed the regret which he was sure they all felt, that the Earl of Dufferin, as announced by his Lordship at the last meeting, had been obliged to resign his office as President of the Society. He had that day left for his higher post at St. Petersburg. In a letter which had been received from him since, his Lordship expressed his great "regret that during his short term of office he should have been so continually prevented attending, and could only trust that the Vice-Presidents, alternately or as may be settled among them, would kindly undertake to perform the duties until another President could be elected."

Before the papers were read, the Chairman said he wished to call attention to evidence of great energy and enterprise in geographical discovery in two different directions. Colonel Prejevalsky, whose former travels in the plateau of Thibet and over the great steppes of Mongolia were familiar to many members of the Society, was about to take his seventh journey into those wild altitudes. He would proceed from Semipalatinsk on to the Desert of Gobi, and thence endeavour to penetrate into Thibet across the northern boundary, descending to the Brahmaputra. This was a most adventurous expedition; but he had been so successful hitherto, and the Geographical Society of St. Petersburg, as well as the Russian Government, had so liberally provided him with all the means he desired, that it might be confidently hoped he would ultimately succeed, and bring back a great harvest of geographical knowledge for the benefit of the world. The Royal Geographical Society had nothing to do with what might be the more immediate or the ulterior objects of the Russian Government in obtaining information of those wild lands, which hitherto had been almost a blank in European maps. What the Society had to regard was the energy, skill, and science with which the staff officers pursued their labours in these extended and perilous journeys through the steppes and highlands of Asia. It was pleasant to find from another item of news that men who devoted a portion of their lives to the advancement of geographical knowledge in the lesser known regions of the world, were duly honoured and their merits recognised by the highest personages in their own countries, as the following paragraph from the telegraphic news of the day would show: "Captain Martini and Count Pietro Antonelli were received in private audience yesterday by the King of Italy, and in the afternoon by the Pope, previous to starting for Africa, to join an expedition there. They would be conveyed in one of the Italian vessels of war." The King and the Pope—the spiritual and the

temporal powers—thus united in doing honour to those travellers who were willing to risk their lives and devote their energies to the advancement of geographical knowledge. It was pleasant to see that in Italy such honour was paid to geographers, and it should act as a stimulus to geographers everywhere, to deserve similar marks of distinction and interest in their labours.

The following papers were read :—

1. On the Basin of the Helmund. By C. R. Markham, C.B., F.R.S., Secretary R.G.S.
2. The Mountain Passes leading to the Valley of Bamian. By Lieut.-General E. Kaye.

Mr. Markham's paper was published in the number of the 'Proceedings,' for March, p. 191; General Kaye's, with the discussion on both papers, in the present number p. 244.

THE NEW PRESIDENT.—The Right Hon. the Earl of Northbrook has accepted the invitation of the Council to serve as President of the Society, for 1879-80. He will, therefore, be nominated for election at the Anniversary Meeting, on the 26th of May next.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—February 21st, 1879: M. DAUBRÉE in the Chair.—M. CH. MAUNOIR, the General Secretary, announced that he had received notice of the foundation of three new Geographical Societies in the provinces: one at Mont-de-Marsan, in the Département des Landes, another at Rouen, and the third at Nancy. It was further stated that the Society at Saint-Gall, in Switzerland, was making rapid progress, counting now 300 members, and that at Stockholm the Anthropological Society had added Geography to its programme. M. Maunoir congratulated the Society on these evidences of increased attention shown on all sides to their branch of science.—M. de Ujfalvy informed the Meeting that he had learned through M. Müller, of Tashkend, that M. Mathieu, a Russian officer, had just returned from a journey of exploration in Badakhshan, which place, he added, had not been scientifically visited since Lieutenant Wood. Full details of the Expedition would shortly be sent.—M. Malte-Brun communicated some observations on the subject of the Map of Ancient Gaul, recently published by M. Alex. Bertram, Director of the Museum of St. Germain. The map, in 4 sheets, drawn and engraved by Erhard, under the direction of Colonel Coynard, was the fruit of the labours of a Commission of Archaeologists and Geographers, nominated in 1860 by the Minister of Public Instruction. It enabled the student to reconstruct, as it were, the history of the aboriginal inhabitants of Gaul, showing their customs and the progress gradually made in primitive civilisation. Thus the epoch of cave-dwellers was seen to be followed successively by the ages of stone, bronze, and so forth. Special maps illustrating separate archaeological epochs were to be placed in corresponding rooms of the Museum at St. Germain, one of them, selected as especially worthy of mention as a beautiful specimen of Cartography, being by M. Henry Erhard, and illustrating the age of dolmens and covered alleys. It resulted from a comparison of the sites of these primitive remains that the dolmens, on the one hand, and the tumuli on the other, occupy two distinct regions, sharply defined by an ideal line commencing at Marseilles, ascending along the Rhone up to Lyons, then curving slightly to the west, so as to separate Burgundy from Nivernais, leaving Rheims a little to the west, and extending towards Germany in a north-easterly direction. This ideal line between the dolmens on the west and the tumuli on the east, corresponds with the line of separation between the implements of stone, on the one side, and those of bronze and

iron on the other. The skulls found in the burial-places demonstrate the existence of two quite distinct races.—A letter was read from Perc Duparquet (missionary in South Africa) to the Abbé Durand, which supplied information regarding the negro tribes inhabiting the borders of Cape Colony, principally the Damaras.

March 7th, 1879: M. DAUBRÉE in the Chair.—A letter was read from Dr. Jules Crevaux, dated from Pará, January 19th, announcing that he had reached that place, bringing with him all the observations he had made on the River Oyapok and on the Paru; among them were a large series of notes on the geology of the regions he had traversed in his overland journey from Cayenne to the Amazons. He was preparing to embark for France, and hoped soon to give an account of his explorations, in person, to the Society.—The President announced that M. Savorgnan de Brazza and Dr. Ballay had been made chevaliers of the *Légion d'Honneur* for their Expedition on the Ogové.—A letter was read from M. L'Abbé Delaize, Tabora, end of October, announcing his safe arrival there with his caravan of nearly 500 men. He had left Zanzibar on the 25th of July. He was in excellent health, and full of hope.—A paper was read by M. Schrader "On Alpine Clubs," in which he described the mountain masses explored by these societies, dwelling more especially on the French Alps and the Pyrenees, which are the favourite ground of French tourists. In the course of his address M. Schrader remarked on the great increase of Alpine climbing in France, and the growing number of school parties who make pedestrian excursions in the mountain districts under the charge of professors, receiving from the latter practical instruction on scientific subjects on the way.—M. Dunoyer de Ségonzac, sub-director of the Chinese Mission, gave the Society an account of the ravages of the plague in South-Western China. The disease was imported into Yun-nan from Birmah in 1856, or, according to some accounts, in 1844, at a time when it had disappeared from Egypt and Turkey.

Geographical Society of Berlin.—March 8th, 1879: Dr. NACHTIGAL, President, in the Chair.—In opening the proceedings, the President alluded to the great loss the Society had sustained during the past month by the deaths of Field-Marshal Von Roon, Dr. Blau (the German Consul-General in Odessa), and Professor Walter. Von Roon, he said, was one of the earliest pupils of Ritter, and the author of the first Manual of Geography written in the spirit of his teacher, which has not only made its way in the military colleges, but also in middle-class schools. Dr. Blau was formerly secretary of the German Oriental Society, and had earned lasting renown, not only by his philosophical works, but by his publications on the geography and ethnography of Bosnia and Herzegovina, which he brought out whilst serving as Consul-General at Trapezunt, Serajewo, and Odessa. Dr. Walter had been for more than twenty years secretary of the Berlin Geographical Society.—A letter was next read from Gerhard Rohlfs, stating that he was delayed at Sokna, twelve days' march south-east of Tripoli, waiting for the Emperor of Germany's presents for the Sultan of Wadai. These presents had been sent from Genoa in the middle of January, and had been given up for lost, but recent advices from Tripoli had announced their arrival there, so that the great Central African Expedition would soon be able to resume its journey. Rohlfs had occupied his involuntary stay at Sokna in making zoological collections; his companion, Dr. Stöcker, had been usefully engaged at the same time in astronomical observations, the results of which had been sent to Berlin.—Letters were read from Dr. Bastien, who, eight months previously, had set out on his scientific tour through Persia, India, and the Indian Archipelago, and about whose health unsatisfactory reports had been received. He had now written from Calcutta, informing the Society of his approaching departure for Assam, and thence to Java. His health had improved during his journey through

Northern India. The ethnological collections made by him in Persia, and filling several cases, had arrived safely at the Royal Museum in Berlin.—Papers were read, 1. "On the History of Discovery on the North Coast of Siberia down to the Voyage of the 'Vega,'" by Dr. Peschuel-Loesche; 2. "Recent Discoveries by the French in the Ogowé Region," by Dr. Richard Kiepert.

Geographical Society of Halle.—March 12th, 1879: Professor KIRCHOFF, President, in the Chair.—This was the concluding meeting of the Session 1878-9. In the Report read by the President, the Society was congratulated on the steady progress it had made during the year. The total number of members now amounted to 179, of whom 11 were honorary or honorary corresponding. The library had been enriched by numerous donations, and through the exchange of their 'Proceedings' for the publications of other societies.—The following papers were read:—"On the Temperature, Winds, and Rainfall in the Halle District," by Herr Kleemann, in which the author gave the general results of twenty-seven years' meteorological observations; and "On the Aims of the Geographical Society of Montpellier," by Herr Fuhst. It was brought forward as an interesting fact that, in the list of 500 members of this Society there were no fewer than eighty names of Germans; so strong is the German element here as in other large French seaports. The Montpellier Society numbers upwards of 500 members, and its administration is divided into three sections, respectively for Physical, Historical, and Economic-Statistical Geography.—Professor KIRCHOFF was re-elected President for 1879-80, and Dr. von Fritsch, Vice-President.

Imperial Geographical Society of St. Petersburg.—February 7th, 1879: M. P. DE SÉMÉNOF, Vice-President, in the Chair.—The secretary read the concluding portion of his report for 1878, referring more especially to the labours of the affiliated Society of Eastern Siberia. The most important exploration of the year was that of the shores of Lake Baikal, by M. Chersky. The exploration was chiefly geological, and extended from the north-eastern end of the lake to the mouth of the Barguzine, including the region between the sources of the Angara and the Buguldeika. M. Chersky's work would thus fill a blank left in the geological map of M. Chénokofsky.—It was announced that M. Potania would leave St. Petersburg for his expedition to Mongolia and the sources of the Yenisei at the end of February, entering from Western Siberia; and that investigations were being carried on regarding the recent diversion of part of the waters of the Oxus into its old bed, the Uzboi; according to M. Helmann, the engineer charged with the investigation, the flow of water in the early days of December was at the rate of 2000 cubic feet per second, and the new course of the river had already reached Lake Sary-Kamish.—A paper was read by M. Musketof on his recent journey to the Alai and Chatyr-Kul.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

EUROPE.

Bavaria, S.—Die Strassen der Schweiz. Gedrängte Darstellung ihrer historischen Entwicklung und ihres gegenwärtigen Bestandes, mit einem Anhang über das schweizerische Postwesen. Zürich (Orell, Füssli, & Co.): 1878, 4to., pp. 155, maps, pls. (*Williams & Norgate*.)

An historical account of the ancient roads in Switzerland, with a practical description of those now existing. The maps show the Roman and present chief lines of communication.

Kirchner, J. J.—Bosnien in Bild und Wort. Wien (Hartleben): 1879, 8vo., pp. 80, pls. (*Asher*.)

Consists of 20 drawings of salient natural and architectural features, with explanatory text by Amand von Schweiger-Lerchenfeld.

La Favière, P. Aubert.—De Cannes à Gènes. Guide pittoresque illustré. Cannes: 1879, 16mo., pp. 256, maps, plans. (*Dulau*.)

Lang, R. H.—Cyprus: its History, its present Resources and future Prospects. London (Macmillan): 1878, 8vo., pp. 370, 2 illustrations, 4 maps.

Contains original information upon agricultural and economical capabilities. The special maps are reproduced from Gaudry.

Lepsius, R.—Das westliche Süd-Tirol, geologisch dargestellt. Berlin (Hertz): 1878, 4to., pp. 375, map in cover, pls., woodcuts. (*Williams & Norgate*.)

This work, supported by the Royal Academy of Sciences, Berlin, discusses the topography, physical geography, geology, and paleontology of Western South Tirol.

Löher, F. von.—Cypem. Reiseberichte über Natur und Landschaft, Volk und Geschichte. Stuttgart (Cotta): 1878, sq. 8vo., pp. 376. (*Dulau*.)

— Cyprus, Historical and Descriptive. Adapted from the German of Franz von Löher, with much additional matter, by Mrs. A. Batson Joyner. London (Allen): 1878, sm. 8vo., pp. 308, 2 maps.

Herr Löher's experiences were in 1877.

Mas Latrie, L. de.—L'île de Chypre: sa situation présente et ses souvenirs du moyen âge. Paris (Firmin-Didot): 1879, 12mo., pp. 430, map. (*Williams & Norgate*.)

The map is an application of ancient nomenclature to modern draughtsmanship. A number of epitaphs of the thirteenth and fourteenth centuries are reproduced, with comments.

Mojsisovics von Mojsvar, E.—Die Dolomit-Riffe von Südtirol und Venetien. Beiträge zur Bildungs-geschichte der Alpen. Wien (Hölder): 1878, Heft 1, 8vo., pp. 88, photographs, map, fo., separate. (*Williams & Norgate*.)

The commencement of a work (supported by the Royal Academy of Sciences, Vienna) which will apparently contribute very much to a correct appreciation of Alpine physical geography. The map (in 6 sheets) will illustrate the formations of the Tirole-Venetian highlands between Etsch and Piave: the present sheet gives the district from Brixen to Bozen, including the Seisser Alp.

Rodwell, G. F.—Etna: a history of the mountain and of its eruptions. London (Paul): 1878, sq. 8vo., pp. 146, map, illustrations.

An amplification of the author's article on the same subject in the 9th edition of the 'Encyclopedia Britannica.' The only work in our language exclusively devoted to the mountain.

Santini, —.—Dictionnaire général, en une seule série alphabétique, des Communes de France et des Colonies, comprenant la nomenclature complète des Communes, Villages, Bourgs, Châteaux, &c., avec la chiffre de la population, tous les bureaux de poste, la distance kilométrique de Paris, &c. Saint Denis: 1879, 8vo., 1174 pp., double col. (*Dulau*.)

An entirely new work, the information contained in it being derived from the most recent authorities.

Schweiger-Lerchenfeld, A. von.—Bosnien, das Land und seine Bewohner. Geschichtlich, geographisch, ethnographisch, und social-politisch geschildert. Wien (Zamarski): 2nd edition, 1879, 8vo., pp. 213, map, 9 pls.

The author succinctly discusses the ancient history, geography (including geology, meteorology, productions, &c.), political and local divisions, inhabitants (with religion, legends, languages, &c.), political economy, mental cultivation, and administration of Bosnia. The plates (apparently from original drawings)

represent various combinations of natural and architectural objects of interest. The map (scale 1:1,480,000) includes also Montenegro, the Herzegovina, and part of Servia.

Schweiger-Lerchenfeld, A. von.—(See KIRCHNER.)

Seue, C. M. de.—Historisk Beretning om Norges geografiske Opmaaling fra dens Stiftelse i 1773 indtil Udgangen af 1876. Kristiania (Grøndahl): 1878, 8vo., pp. 316, maps.

An historical account of the origin and progress of the trigonometrical and other surveys of Norway. The maps represent the triangulation from 1779 to 1876 (scale 1:2,000,000, wrongly given as 1:2,00,000), and the coast survey (scale 1:2,400,000); general index maps of Southern Norway, showing details of progress, &c., are also given.

Thomson, J.—Through Cyprus with the Camera in the Autumn of 1878. London (Samson Low): 1879, 2 vols., 4to., pp. 54, 60 photographs.

A pictorial account of the island, by the author of the paper in our 'Proceedings' for the current year, p. 97.

Tirol.—Wanderungen durch Tirol und Vorarlberg. Geschildert von Ludwig von Hörmann, Herman von Schmid, Ludwig Steub, Karl von Seyffertitz, Iwan Zingerle. Stuttgart (Kröner): n.d., folio, pp. 284, 48 plates, woodcuts. (*Asher.*)

An excellent delineation of the natural features, chief historical localities, and race-types of the district discussed. Some of the plates, especially such as appear to be from photographs, enable a correct appreciation of the physical geography to be arrived at much more rapidly than written descriptions.

Winterberg, A.—Malta. Geschichte und Gegenwart. Nach den besten Quellen und persönlicher Anschauung bearbeitet. Wien (Hartleben): 1879, 12mo., pp. 296, illustrations, map. (*Asher.*)

Discusses the topographical, economical, military, and antiquarian aspects of the island.

Yriarte, C.—Les bords de l'Adriatique et le Monténégro. Paris: 1878, 4to., maps, pls.

Comprises Venice, Istria, the Bay of Quarnero, Dalmatia, Montenegro, and the Italian coast.

Zschokke, H.—Reisebilder aus Finnland und Russland. Wien (Braunmüller): 1878, 8vo., pp. 368. (*Williams & Norgate.*)

Forms vol. ii. of the author's 'Reisebilder aus dem Skandinavischen Norden und Russland,' giving a statistical and historical sketch, and an account of the most salient features, chiefly economical.

AMERICA.

Beerbohm, J.—Wanderings in Patagonia; or Life among the Ostrich-hunters. London (Chatto & Windus): 1879, 8vo., pp. 278, map, pls.

The author visited south-eastern Patagonia in August, 1877, on a survey of the country between Port Desire and Santa Cruz, but adds nothing to the knowledge of the district he traversed. His route was from Mt. Sholl, west of Port San Julian, across the Chico to Santa Cruz, and then south to the Gallegos River and Punta Arenas; in fact, almost precisely the same as that of Captain Musters in Southern Patagonia. Any points of geographical interest are quotations from Moreno. The scale given on the map (by Weller) is unintelligibly erroneous, each degree being according to it equivalent to 215 miles.

Clark, E.—A Visit to South America. With notes and observations on the moral and physical features of the country, and the incidents of the voyage. London (Dean): 1878, 8vo., pp. 355.

Duncan, F.—The Royal Province of New Scotland and Baronies. London (Clowes): 1879, 8vo., pp. 20.

Fregeiro, C. L.—*Diccionario geográfico é histórico del Rio de La Plata ó sea de las Republicas Argentina Oriental del Uruguay y Paraguay. Entrega 1^a.* Buenos Aires: 1878, large 8vo., pp. 1-32. (*Dulan.*)

This first part contains from "Abacqua" to "Aguilot." The scope of the work is geographical and historical, the geographical portion comprising physical, political, and economic geography, and ethnology, and the historical also including biography and bibliography.

Hayden, F. V.—*Tenth Annual Report of the United States Geological and Geographical Survey of the Territories, embracing Colorado and parts of adjacent Territories, being a Report of Progress of the Exploration for the year 1876.* Washington (Government Printing Office): 1878, 8vo., pp. xxix and 546, pls. 79, woodcuts, 3 maps.

This report, marked by the same completeness of execution and regard for scientific matter of all kinds foreign to the object of the survey but incidentally obtained during its progress, that have been conspicuous in its predecessors, contains particulars of the completion of the survey of Colorado; the area under investigation being in the interior of the country, remote from settlements, and among hostile bands of Ute Indians. The work was undertaken by four parties, of which the first, under Mr. A. D. Wilson, was occupied chiefly at the head waters of the Rio Grande, finishing 1000 square miles of topography, with 11 primary geodetic stations, connecting the whole of Southern and Western Colorado. Amongst other points, the correct altitude of Blanca Peak was taken, 14,464 feet above sea-level, probably the highest point in the United States. Mr. H. Gannett's party worked an area of some 3500 miles south of the Sierra la Sal and north of the Rio Grande, specially studying the physical conformation of the banks of that river, and establishing 60 stations. The party under Mr. G. B. Clittenden was engaged on the survey of some 3800 square miles, almost entirely unexplored hitherto, and nearly devoid of timber and water, from the White River to Utah Territory. The last division, under Mr. G. R. Bechler, undertook the Yampah division in N.E. Colorado, 3000 square miles in extent. Prominence is given to the various geological features of interest detected during these expeditions; and the Topographical reports of the chief officers contain much information on climate, cultivable areas, irrigation, and other subjects of economic value, in addition to accounts of the physical geography of the regions surveyed. Accurate observations on ancient ruins and other objects interesting to archaeologists and ethnologists are also made; and there is some reference to palæontology and zoology. The maps (scale 1:750,000, or 12 statute miles to the inch) illustrate the general geology, the distribution of vegetation, minerals, and other economic subjects, and the drainage of Colorado.

Margry, Pierre.—*Mémoires et Documents pour servir à l'histoire des origines françaises des pays d'outre-mer. Découvertes et établissements des Français dans l'Ouest et dans le Sud de l'Amérique Septentrionale (1614-1698).* Paris (Maison-neuve): 1879, 3 vols., 8vo. (*Dulan.*)

Vol. i. (pp. 618, frontisp.), descriptive of the voyages of the French on the Great Lakes, and the discovery of the Ohio and Mississippi, contains accounts of the operations of the Récollets (Le Caron and D'Olbéau), the first Missionaries, 1614-1684; of the endeavours to obtain a footing near Lake Ontario by Bourdon and others, 1646-1687; of the voyages of Raymbault, Nicolet, &c., to Saut Ste. Marie, Michigan, &c.; of Allouez, missionary to the Outaouases, 1613-1689; of the plans of Jean Talon; of La Salle's voyages, with De Casson and De Gallinée; of the voyages of Remy de Courcelles and De Frontenac to Lake Ontario; of missionary work, 1672-1674; of Joliet's discovery of the Mississippi; of the various expeditions of La Salle from 1674 to 1682, with their political results; and of the establishments on the Lakes and Mississippi under him and De Tonty.

Vol. ii. (pp. 617, map) is devoted to the letters of La Salle and his various enterprises from 1678 to 1685, including his visit to the coast of Texas in 1684. The map is a facsimile of one from D'Anville's collection, believed to be from La Salle's own chart; it represents the Bay of Catareoui and its environs.

Vol. iii. (pp. 656, map) continues the account of La Salle's operations to the time of his assassination, with the subsequent action of the French and Spanish, and the ultimate fate of the Colony, in the Bay of St. Louis. A list is given of original documents referring to the whole work, and preserved in the archives of the French ministry. The map, also a facsimile of one in D'Anville's collection, represents the scene of the whole of La Salle's voyages before 1675 and those from 1678 to 1682.

Thevet, André, E.—*Les Singularitez de la France Antarctique*. Nouvelle édition, avec notes et commentaires par Paul Gaffarel. Paris (Maisonnette): 1878, sm. 8vo., pp. 459. (*Dulau*).

A reprint of the 1558 edition.

Turenne, Le Cte. Louis de.—*Quatorze mois dans l'Amérique du Nord*. Paris (Quantin): 1879, 5 vols., 12mo., pp. 264 and 396, map. (*Dulau*).

Besides particulars of travel in the United States on well-known routes, the author describes his experiences in Canada, of which he discusses the physical geography and natural products. He appears to have paid special attention to Manitoba and the Western Lakes, which, with their existing and projected railroad communications, are delineated on the map. The work is of a more practical tone than usual.

Villanneva, A.—*Salitres i Guanos del Desierto de Atacama*. Santiago (Imprenta Nacional): 1878, 8vo., pp. 46, map.

A report by the engineer employed by the Chilean Government to explore the Atacama Desert, especially with regard to its nitrate of soda and guano deposits. A preliminary report by one of the Commissioners, M. A. Pissis, was published in English (Taylor and Francis) last year, with a map not reaching so far to the north as the one (scale 1 : 1,000,000) accompanying the present publication. A list of plants discovered (11 new to science) is given.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

AFRICA.

Friederichsen, L.—*Karte des Handelsgebiets von West-Aequatoreal-Africa*, unter Benutzung der neuesten Quellen bearbeitet und autographirt von L. Friederichsen. Scale 1 : 780,000 or 10·5 geographical miles to an inch. L. Friederichsen, Hamburg, 1878. (*Stunford*.)

This map, which was originally published in the 'Ethiopien; Studien über West-Afrika' of Dr. Hübner-Schleiden, is now sold separately, with an introduction by Ludwig Friederichsen, giving a list of the maps and authorities used in its compilation. The heights are given in metres; the French and Spanish possessions being distinguished by different colours.

Intelligence Branch, Quartermaster-General's Department.—Sheets 4 and 4A of the Map of South Africa, compiled and lithographed at the Intelligence Branch of the Quartermaster-General's Department under the direction of Captain C. E. Grover, D.A.Q.M.G. Scale 1 : 633,360 or 8·6 geographical miles to an inch. 1879. (*Stunford*.)

On these two sheets, which include the present seat of war in Zulu-Land, are shown mountain peaks, forests, and thorn-bush land, but mountain ranges are omitted; railways, roads, and waggon-tracks are laid down. The Zulu Boundary claimed by Ketchwayo, together with Boundary as beaconed off in 1864, and Sir Bartle Frere's award, 1878, are shown. For general purposes these sheets are likely to prove very useful to those who desire to gain information with regard to Zulu-Land and the surrounding countries.

— Rough Map of Zulu-Land for the guidance of Officers commanding Columns. Scale 1 : 253,440 or 3·5 geographical miles to an inch.

This map shows the three lines of advance on Ondi (Uhndi), Ketchwayo's new kraal, from Utrecht, Rorke's Drift, and Lower Tugela Drift; the waggon tracks on which each advance can be made are coloured brown, other waggon tracks being shown by a single line. The boundaries of the several tribes,

together with their numbers, the names of their chiefs, and the places where wood is to be found on the waggon track between Rorke's Drift and Ondi (Ulundi), are laid down.

Johnston, A. K.—Library Map of Africa. New edition. Scale 1:5,977,382 or 82 geographical miles to an inch. (*Stanford, 1879.*)

This is a four-sheet map, on which are shown the tracks and surveys of Lieut. Shergold Smith and Mr. O'Neill, of the Church Missionary Society; of Major Prout and other officers of Col. Gordon's party in Darfur, Kordofan, and parts of the Upper Nile Basin; of the Scotch Missionary Expedition in the Lake Nyassa district; and of Mr. H. M. Stanley's journey across Equatorial Africa. The different possessions and nationalities are distinguished by colours.

— **War Map of Zulu-Land and adjoining Districts, with a Map of the Cape Colony.** Scale 1:640,000 or 8·7 geographical miles to an inch. Second edition. (*W. & A. K. Johnston.*) 1879.

The second edition of Johnston's War Map shows the mountains, bush, and forests in Zulu-Land, as far as known, and would appear to include all that is shown on the maps of the Intelligence Branch of the Quartermaster-General's Department; the general lay of the mountains corresponds with Jeppe's map of the Transvaal and the surrounding territories.

Smith & Sons, W. H.—War Map of Zulu-Land and adjoining Countries in South Africa, with full description of the Country and the People. Scale 1:1,660,000 or 22·5 geographical miles to an inch. (*Smith & Sons.*) 1879.

Stanford, E.—Stanford's large Map of Zulu-Land, with adjoining parts of Natal, Transvaal, and Portuguese Africa. Scale 1:633,360 or 8·6 geographical miles to an inch. 1879. (*Stanford.*)

This map contains a great deal of hill shading, the object being to show that this part of Africa partakes of the character which, in a more or less marked degree, distinguishes the whole eastern side of the continent; that is, a succession of terraces, increasing in elevation from the coast to the edge of the great central plateau. The upper and lower terraces of Natal have, in this map, been prolonged towards the north through Zulu-Land; and though this portion of the country has never been even roughly surveyed, there can be but little doubt, that it is the southern prolongation of Lobombo Range which forms the upper terrace of Natal; while, with the information gleaned from travellers and traders in Zulu-Land, there is every reason to believe that the whole country lying between the Tugela and the Umvolosi rivers is a counterpart of the country of Natal between the upper terrace and the sea-coast. It must, however, be remembered that this is, after all, but conjectural geography; and the watersheds and even the general lay of the mountains may hereafter be found to differ widely from those laid down on this map. The boundaries ceded in 1854, the boundary beaoned off in 1864, and the boundary claimed by Cetewayo, are laid down; as are also the encroachments by the Transvaal boers, and the boundary awarded by the High Commissioner, 1878. Roads, tracks, railways (open and proposed); together with the heights in English feet; tribes and their probable numbers are also shown.

Wyld, James.—Wyld's Military Sketch of Zulu-Land, Transvaal, the Frontiers of Natal and the Orange Free State, with the Portuguese Possessions around Delagoa Bay, showing the Kraals and Military Localities of Zulu-Land and Ketchwayo's country, with the Roads, Villages, and Military Positions. Scale 1:730,000 or 10 geographical miles to an inch. (*Wyld, 1879.*)

EDUCATIONAL.

Bonnefont, L.—Planisphère terrestre à l'usage des écoles avec l'indication des courants, etc. L. Bonnefont, Paris, 1878. 4 sheets coloured. (*Dulau.*)

Church Missionary Society.—Map of Africa. Size 5 feet 6 inches by 5 feet 2 inches, scale 76 miles to an inch. 1879. (*Church Missionary Society.*)

— Map of Eastern Equatorial Africa. Size 6 feet by 6 feet, scale 21 miles to an inch. 1879. (*Church Missionary Society.*)

These two maps are printed on calico, and the physical features, such as mountain ranges, rivers, and lakes are clearly shown; from this fact, and it being possible to roll them up in a small compass, they are likely to prove useful to illustrate lectures given in schools, or rooms of limited size.

Johnston, W. & A. K.—Outline test Map (unlettered) of Palestine. Size 50 by 42 inches. (*Johnston*, 1879.)

— Four-sheet Map of England, size 72 by 63 inches. (*Johnston*, 1879.)

— The Threepenny Atlas, containing 16 coloured maps. (*Johnston*, 1879.)

— Third Standard Atlas and Geography—England and Wales. (*Johnston*, 1879.) This Atlas contains 12 coloured maps and letterpress, crown 8vo.

— Fourth Standard Atlas and Geography—Great Britain, Ireland, and Colonies. (*Johnston*, 1879.)

This Atlas contains 15 coloured maps and letterpress, crown 8vo.

— Fifth Standard Atlas and Geography—Europe, Physical and Political. (*Johnston*, 1879.)

This Atlas contains 23 coloured maps and letterpress, crown 8vo.

— Sixth Standard Atlas and Geography—outlines of the Geography of the World. (*Johnston*, 1879.)

This Atlas contains 20 coloured maps and letterpress, crown 8vo.

Lemercier.—Europe—Carte murale à l'usage des écoles. Lemercier, Paris, 1878. (*Dulaud*.)

Stanford, E.—Map of London for the use of schools. Scale 1 : 24,200 or 3 inches to a mile. 1879. (*Stanford*.)

This map has been prepared to meet the requirements of the Education Code:—"Special Knowledge of the County in which the school is situated."

The Counties, the Urban Names of Districts, the Rivers, Hills, Parks, Woods, Open Spaces, Canals, Docks, Railway Stations, Gas, Water, and Sewage Works, and Public Buildings, are all clearly shown by different styles of lettering and appropriate colouring; also the county boundaries, the Railways, and the Contour lines, or lines of equal altitude (the heights of all the more important points above the sea-level are also inserted), while a strongly-coloured line marks the Parliamentary Borough boundaries.

— Map of Africa, published under the direction of the Committee of General Literature and Education appointed by the Society for Promoting Christian Knowledge, and of the National Society. Scale 1 : 14,599,200 or 200 geographical miles to an inch. 1879. (*Stanford*.)

ATLASES.

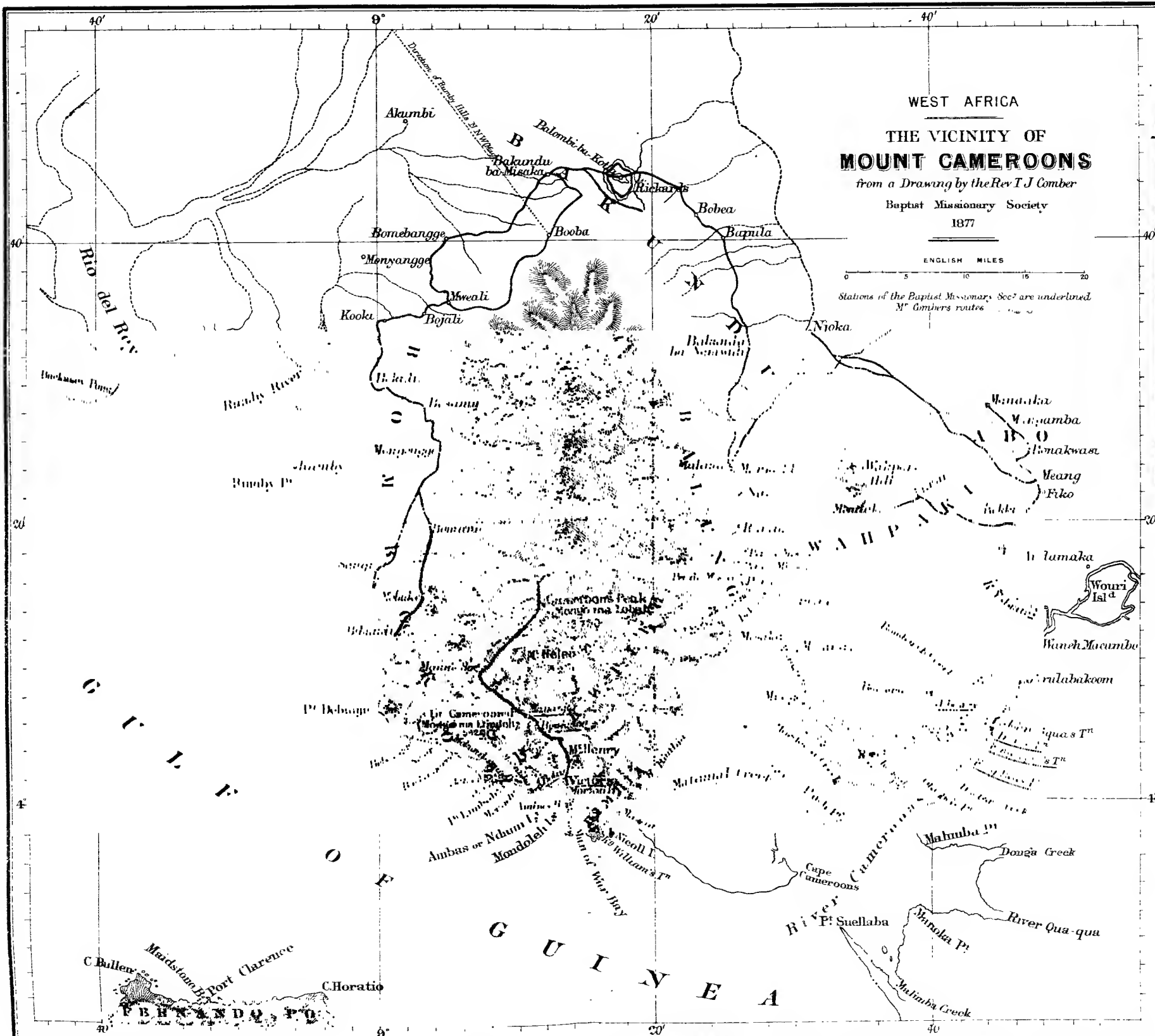
Church Missionary Society.—Church Missionary Atlas, Part VIII. New and enlarged edition. 1879.

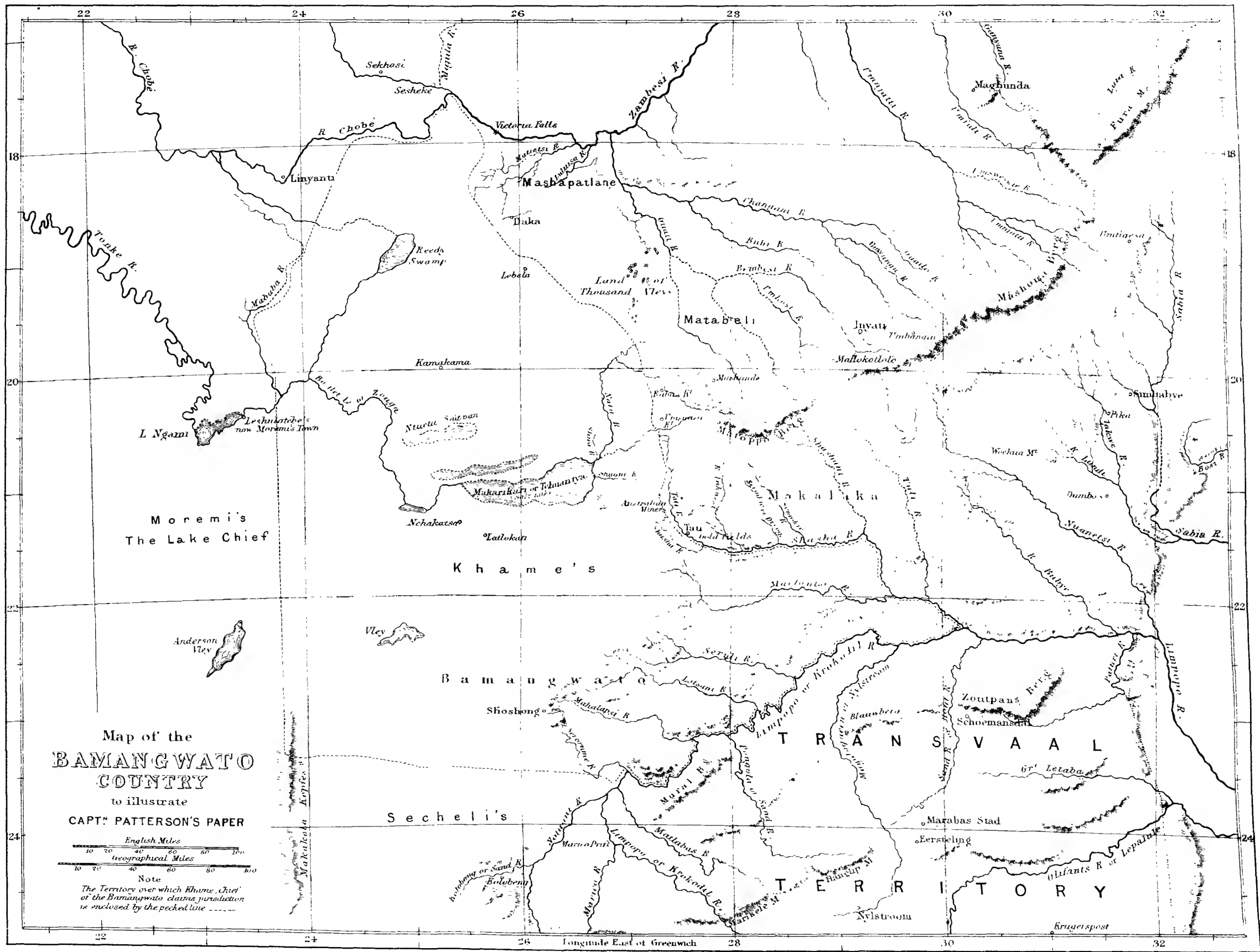
This Part (which contains a Chronological Chart of the progress of the Church Missionary Society, and a map, in Hemispheres, showing the prevailing Religions in the World) completes the new edition of the Church Missionary Atlas. In its compilation use has been made of all the many sources of information which the Church Missionary Society has at its command, and the result is a most useful atlas, containing 32 maps, some quite new, and 150 pages of explanatory and instructive letterpress.

Stieler, Adolf.—Hand-Atlas über alle Theile der Erde. Neu bearbeitet von Dr. August Petermann, Dr. Hermann Berghaus und Carl Vogel. 1 Lieferung. Justus Perthes, 1879. (*Stanford*.)

The contents of this first part of the new edition of Stieler's Hand Atlas are as follows:—No. 34, Frankreich: Blatt 1, Nordwestlicher Theil, von C. Vogel, 1 : 1,500,000. No. 51, Ost-Europa: Blatt 2, Nordost-Russland, von A. Petermann, 1 : 3,700,000. No. 69, Nordwest-Afrika, von A. Petermann, 1 : 12,500,000. *Curtions*: Senegambien, 1 : 7,500,000; Sierra Leone-Küste, 1 : 7,500,000; Gold- und Sklaven-Küste, 1 : 7,500,000. When completed, this atlas will consist of 95 coloured copperplate maps. The first part appeared in February of the present year, and the remaining 31 parts will be published at intervals of from four to five weeks.

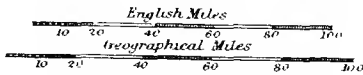






Map of the
**BAMANGWATO
COUNTRY**

to illustrate
CAPT. PATTERSON'S PAPER



Note
The Territory over which Khume, Chief
of the Bamangwato claims jurisdiction
is enclosed by the pecked line -----

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Second Circumnavigation of Lake Nyassa.

By Dr. JAMES STEWART.

(Read at the Evening Meeting, March 10th, 1879.)

Map, p. 352.

IN the paper which I have the honour to lay before the Royal Geographical Society, I wish as much as possible to avoid controverted questions, for the settlement of which we have not yet sufficient materials. The longitudes at the north end of the lake are like the slave trade arrangements at the south end, a little confused. Within the last two days information has been received from Mr. James Stewart, C.E., at present on the Mission staff, that recent observations had led him to shift the longitude at Mankambira's 24 miles further west. It would be a mistake and be specially wrong in me to express any decided opinion on this purely geographical question. Mr. Stewart is a careful observer, and in course of time we shall get information sufficient to settle the point. The map we found most useful (and the same may be said of Captain Elton's party) was that prepared by Mr. James Stevenson, and appended to his pamphlet 'On the Civilisation of South-Eastern Africa.'

The main points of difference from earlier maps in the one which I have had drawn for this meeting,* are three, which I put forward tentatively:—1st. The north end of the lake is moved westwards about a degree. 2nd. The River Rombashe is brought to within about 20 miles of the north-east corner of the lake. 3rd. The River Losewa is placed south-east of Kota-Kota.

I proceed now with the account of our voyage round the lake.

On Monday, the 17th September, 1877, the *Itala* sailed from

* The map alluded to is the large wall-map hung to illustrate the reading of the paper. The inset in the corner of the map at p. 352 is a reduction of this, as far as the northern end is concerned.

Livingstonia Bay for the second circumnavigation of Lake Nyassa. Once before only had the north end of the lake been reached, but no landing had been effected. To Mr. E. D. Young belongs the honour of discovering the important geographical fact that the lake extends a degree and a half further north than was previously supposed according to Dr. Livingstone's observations.

The object of our voyage was twofold:—1st. To carry out the instructions of the Mission committee, received some months before, which were—to examine the north end of the lake with the view to the extension of missionary and other work—to become acquainted with the chiefs and the people on the shores of the lake, and gather such information about that almost unknown region as might facilitate the objects of the Mission. 2nd. To convey Captain Elton and his party, and also Mr. Cotterill and some of his men to the north end of the lake, and thus aid them so far on the journey they contemplated extending by land eastwards from Lake Nyassa to the coast. But for the second object we should have started on our voyage in July.

We were twenty-eight in all on board the *Ilala*, and this number of passengers, with wood for fuel, provisions, tents, baggage, calico, and other cargo, was enough for our small vessel. During the day there was little difficulty, but there was not sleeping accommodation for twenty-eight on board, and it became necessary therefore to land a portion of the party each night whenever that was practicable.

I had asked Dr. Laws to undertake the details of the sailing arrangements, which he managed admirably, retaining for myself the general responsibility and management of the voyage. We had on board an officer of the Union Steam-packet Company, Mr. Hoste, but the work practically of taking the ship to the north end of the lake and back again, lay upon two landmen assisted by one seaman. We had also to find each night a safe anchorage and a suitable landing-place, and this along a coast on which only one or two harbours, chiefly Kota-Kota, were then known, and these not very well. This may perhaps explain some of the delay as well as the anxiety which harassed us, while we sailed along shores that were quite unsurveyed. For whatever we attempted or accomplished, there was one thing we felt bound not to do—to lose the ship. A seaman could afford to do that, but two landmen could not.

On the afternoon of the same day on which we sailed, we reached Mpemba's—a chief whose territory lies off the mouth of the Lintippe (a small river flowing into the west side of the lake), and who had hitherto shown himself to be one of the most determined slave-dealers on the lake. Of all our immediate neighbours at Livingstonia, he had proved himself the least friendly. He refused the present sent at our first settling on the lake, and he behaved but indifferently to certain messengers who were sent to his place some six or eight months later.

We still possess a love token from him in the shape of a spear thrown at one of that party; and he still retains a portion of a truss of calico, some coloured blankets, and other articles, which do not by any right belong to him. Our mode of dealing with this chief, however, may illustrate our general method, namely, the avoidance of all violence; steady persistence in our own course of opposition to the slave trade; and following all up by efforts to carry on friendly intercourse, even though there might be a little unfriendliness exhibited on the other side.

Next day, September 18th, we held due north along the west coast, passing Rifu, the island of Benje, and towards evening we anchored in a small bay without any name, as it seemed to afford us an opportunity of wooding. We were here a little south of Lake Chia. Next day we proceeded still further northwards, and past the entrance to the just-mentioned lake. Great hopes were entertained that Lake Chia would form an important and useful harbour, being completely land-locked and commodious. We spent several days in examining it on our return, and our hopes were doomed to disappointment, as across the entrance there lies a ridge of rocks which gave us much trouble both at our entry and departure. Further examination may disclose a possible channel close to the southern shore, but that at present seems doubtful. We anchored for the night a few miles south of Kota-Kota in an ill-protected bay, which we should not have taken had there been any choice. No anchorage which does not give protection from the south and south-east winds is of much value. Three hours after sunset a gale from the south burst upon us with considerable fury. The ship began to drag both anchors, even though one of them was a very heavy one, suitable for a much larger vessel. The sea came tumbling in upon us with heavy thuds, and very shortly we had astern of us a stretch of grey rock, over which white breakers were flying in large masses. There was a little dim moonlight, which partly revealed to us the danger of our position. Every few minutes was decreasing the short distance that lay between us and destruction. Though loth to lose them, we slipped both anchors and put out to sea, to save our lives and our little ship. We had much difficulty even under sail and steam to get out of a very dangerous position, but we held on through a wild night of storm and confused sea, and got into Kota-Kota harbour next day at two in the afternoon, all pretty well worn out. Mr. Hoste's assistance that night was invaluable. The loss of our anchors cost us five days' delay, involving our going back from Kota-Kota overland, and carrying a boat with us and a party of fifty natives. We managed by sweeping over the spot to recover both anchors, to our no small satisfaction. Kota-Kota was at one time and may be regarded still, as the head-quarters of the slave trade on the south-western side of Lake Nyassa. It is under the government of a half-caste Arab whose

hereditary title is "the Jumbé." He received us in a perfectly friendly way, and is not the same man who ruled at that place a year before.

The town of Kota-Kota is a long rambling collection of huts, built on the slope of a slight hill, and looking down upon the lake. Its sanitary condition is very bad; its chief export is slaves. Large numbers of these were in the town at the time, and had become a sort of unsaleable goods on account of the shutting-up of the coast by the slave trade treaty with the Sultan of Zanzibar.

On Tuesday, the 25th, we crossed over to the eastern shore of Lake Nyassa, intending to make the River Losewa. By the map our course should have been north-east, by actual steering it was south-east. We crossed in about eight hours and a half, and found ourselves abreast of the village of Losewa, which lies at the mouth of a small stream of the same name. There is a small open bay, but no harbour. Our recent experience of nightly gales sweeping down suddenly upon us, made us anxious to get some anchorage where the ship might lie undisturbed, and wearied men obtain that rest and sleep so much needed in an exhausting climate. All our medical experience, both previous and subsequent to this, had sufficiently proved that night watches, and especially a whole night's work, were invariably followed by an attack of fever. And this fever is really, after all, the only difficulty and real obstacle in the way of Englishmen doing any amount of work, even in Central Africa.

An examination of the mouth of the stream showed that it was just possible to push the steamer into a quiet lagoon, where nothing short of a hurricane would disturb her. This was successfully done; and before sunset we went ashore to pay a visit to the chief, and examine the village of Losewa. He was called Kitepete, or sometimes, indifferently, Kungumanje. He was an old man, with heavy features, and a countenance ploughed deeply in all directions with the scars of small-pox. He wore the usual dirty Arab dress, and was only distinguished by two very fine ivory rings or armlets. Kitepete was by no means intelligent, and seemed unable to comprehend what was stated to him about the objects of the English. The interest in reference to Losewa consists in its being the port or landing-place from the western side of the lake for all slave caravans converging towards Kota-Kota; and it is also the point of departure for newly-formed and re-arranged caravans leaving the eastern shore of Nyassa for Kilwa, or any other slaving port on the coast. Its glories and prosperity seem to belong to the past; desolation, dirt, and decay now hold possession of the place.

Next morning before six we steamed out cautiously, and found ourselves shortly afterwards in the deep waters of the lake, well off Losewa village. We sailed along a bold coast with high headlands all day till between five and six in the evening, when we sighted the island of Dikomo, and after some little difficulty came to anchor in a small bay on the north-east side of the island. Here we were detained several days..

About this island great expectations were formed immediately after its first discovery. It was thought likely to prove a valuable station for missionary, commercial, or other purposes. Our visit dispelled the illusion. The island consists of masses of granite and quartz rock, covered with a very thin layer of these disintegrating rocks intermixed with a little pure sand. Vegetable mould is hardly to be seen, except in a few gullies. This is towards the eastern side; at the western side the soil is considerably better. Cassava grows plentifully, but it seems to be almost the only crop that does grow, and it is well known that cassava will grow in the very poorest soil. There were, however, a few cattle on the island.

The island itself is not more than 3 to 5 miles long and 1 to 3 broad. Local winds blow regularly at certain hours of the day with considerable violence. These caused us to shift from one bay to another, more frequently than we cared to do. At length the wooding was completed; a visit had been paid to Chitesi, the chief, on the mainland; the invalids were now recovered, and we proposed to cross the lake again to the western shore to visit Mankambira, the most considerable man on the upper half of the western side of Lake Nyassa.

We steamed round the north-east end of Dikomo, and then nearly west for Mankambira's territory. The sun had left us before we had made the land, and we found ourselves, an hour after dark, under a mountainous shore, with no soundings, but the roar of the surf not far distant. We therefore resolved to put to sea for the night, and bore away due north, keeping well off the coast. All that night and next day we steamed along the western shore, the mountains of which at this part come down somewhat abruptly into the lake. There are level terraces here and there, and occasional villages; the height of the mountains is from 2000 to 3000, or even 4000 feet. About 3 P.M. on Wednesday, October 3rd, we rounded a promontory, which forms the southern base of a singularly shaped mountain called by the natives Mount Chombe, but which has also been called Mount Waller, after the well-known editor of 'Livingstone's Last Journals.'

This mountain betrays even at a great distance its essential difference as a stratified rock from all the other masses of mountain by which it is surrounded. Black bands appear to run across its face, but these are due rather to differences of angle at which the rock lies exposed, than to actual diversity of colour in the sandstone of which it is chiefly composed. Coal has since been discovered near its base. The bay lying round its base has been called Florence Bay, and also Kitimbo Bay. It is large, and pretty well protected from the south and south-west winds, though exposed to those from the east. Here we remained a few days to wood, and some of us to recruit by a little rest, as thirty consecutive hours of work previous to our arrival had helped, as usual, to set up a little fever. Meantime those whose duties did not bind them to

the ship went to examine the surrounding country. One party ascended Mount Waller, and Mr. Cotterill found it to be close on 4000 feet above the lake, by the aneroid, or over 5000 above the level of the sea. A day or two later, Captain Elton with some of his party went in search of elephants, and in the short space of two hours was successful enough to shoot four. They were fortunate in getting close to the herd; and the correct theory and practice of elephant-shooting seems to be this—to pour in the heaviest broadsides at the closest quarters, and in the most vital parts, but at all events to keep pouring in three or four-ounce bullets, with charges of six, eight, or even ten drachms of powder. This battue gave the hunters a certain quantity of ivory, and the people of some of the neighbouring villages an enormous supply of food. One of the hunting party had a narrow escape from the bursting of an elephant rifle. I hope the day is not far distant when the African elephant will be turned to better uses, and when the valuable services and extraordinary sagacity of this animal will be some protection against the indiscriminate slaughter to which it is at present exposed. On this occasion was witnessed the fact, which has been often repeated and often denied, that the unwounded elephants will go to the assistance of one that is wounded, and urge and aid him to escape.

It was Wednesday, the 10th of October, before we were quite ready to leave Florence Bay. A heavy surf up till noon generally prevented communication between the shore and the ship. The afternoon was exceedingly beautiful even for Lake Nyassa, and the atmosphere wonderfully clear. Both sides of the lake were distinctly visible. At this point they generally are, if the weather is at all favourable; but in thick weather, from any position a little further south, the contour of the land would easily lead one to suppose that the mountains closed in to the north, and that the northern limit of the lake had been reached. This was probably the origin of Livingstone's mistake in 1861, when the northern limit of Nyassa was fixed at about lat. 11°. The western shore of the lake is here considerably varied by hill and valley, and the outline of the coast is broken by the wide sweep of Florence Bay, which is 8 or 10 miles across at the entrance. We anchored for the night in a small bay, for which we could get no name, as we found no natives, but which we called for convenience' sake "Deep Bay." It runs well into the land, and is fairly protected from all except easterly winds; a line of rocks or rocky islands, however, runs across a portion of its mouth.

We continued our voyage northward next morning; from this point the high land on the western shore of the lake begins to recede, and there is the commencement of that long plain which forms the north-west and northern termination of the lake. About half-past four on the same afternoon we found ourselves safely at anchor in a land-locked lagoon, called the Kambwe Lagoon. It had never been visited before.

On account of its safe anchorage and the friendliness of its people, and its convenient position towards the end of the lake, it is likely in the future to become a well-known place. The depth of water on the bar or entrance is not great. We found it only about 7 feet in the dry season, but a small vessel may lie safely there in any weather.

On the following morning we steamed still northwards, but shortly our course was changed to north-east, and shortly afterwards again to due east. We were now approaching the northern limit of the lake. The question was, could we find any river mouth, or bay, or estuary, which would afford a safe and convenient anchorage for the ship? From all we had heard, the region was one of frequent storms, and very destitute of shelter. We held along the coast as close as it was safe to do so, and at noon we made out a small river with a bar at its mouth, or what seemed like that. The ship's head was put towards the shore, and on examination we found 7 feet of water on the bar, and 18 feet inside. In a volume published recently,* I find the following note of our making the north end of Lake Nyassa:—"At about ten this morning Dr. Stewart became uneasy at seeing the east side close in with a high range of mountains (9000 to 10,000 feet), and a slight south-east swell rising. He said, 'If we could not get a harbour, we could look at the north end of the lake, and then steam back to last night's anchorage.' I agreed, but begged him to keep inshore more, so that we should not pass any shelter." My remark on this is, first, I do not know what else could have been done than to steam back to our previous anchorage, if no shelter could be found; but if this statement is meant to support a claim to the discovery of the Rombashe River as made by Captain Elton's party, I demur, and shall have something to say further on. The plain facts are these: We were getting jammed up in the north end of the lake, with the long stretch of 300 miles of sea behind us, over which the south-east wind often sweeps suddenly with great fury. To make an absolute promise as to what we should or should not do, would have been absolute unwisdom. I remember the occasion and the position well. I was standing leaning against the forward awning stanchion, looking anxiously, perhaps gloomily, at the line of coast into which we had as yet discovered no safe opening into which to thrust the ship. Mr. Young's rough experience a year before put us on our guard, and was not encouraging on a lake where storms are sudden and harbours scarce.

We did at length discover the small river of which we were in quest, up which we steamed 2 miles, and the name of which we afterwards discovered to be the Rombashe. It is difficult to convey to any who may now listen to this paper an adequate impression of the relief afforded us by this discovery of a practicable harbour for our little ship. The question was now settled as to whether such a place of refuge could be found

* Elton's 'Journals: Travels and Researches among the Lakes and Mountains of Eastern and Central Africa.' p. 319.

at the north end of Lake Nyassa. The natives were in great consternation as we entered the river, and began driving off their cattle into the tall grass, in which they were completely hidden. The first village also was emptied of inhabitants. This was not surprising; for certainly never during any experience of theirs or of their forefathers, had so strange-looking an object as the small steamer *Ilala* ever come up their quiet river—almost to their very doors.

We had now fulfilled our voluntary promise. We had carried Captain Elton and his party 500 miles, done our best for them during two months, and landed them, without accident or loss of any kind, safely at a point on which white men had never set foot before.

Here we lay ten days during and after landing Captain Elton's party. Its latitude has been set down at $9^{\circ} 38'$ or $9^{\circ} 40'$ south. The trend of the lake from the Rombashe till it meets the Livingstone Mountains on the eastern shore, is east by a little north. The distance, as near as I could judge, was 18 miles, or perhaps 20 miles. Practically the Rombashe is the north end of the lake, and is the only harbour so far north as yet discovered. The breadth of the river is 150 to 200 feet. The banks are quite low, and in the wet season would be submerged at some points. The river itself does not maintain this breadth and depth for any considerable distance, but becomes divided a few miles further up into two or three channels.

We found the northern end of Lake Nyassa resting on, or forming a great plain, about 30 or 35 miles long, by 20 or 25 broad; the plain narrows towards its northern end, and loses itself among the hills.

According to information obtained from the natives, there is a small stream lying east of the Rombashe, called the Mbaka; and another to the west, called the Wila or Chi-wila. Both streams are easily fordable, and are apparently of no value as navigable inlets into the country. The people dwelling on the banks of the Rombashe and generally in the plain already described, call themselves the Malema, a subtribe of the Mchungu or Wachungu or Wasango, and extend for a couple of days northwards. Behind them to the north-east, and perhaps also to the north-west, there lie the Wakamanga, and further north Mercere. The name Bachusia was also used, probably for a tribe touching those already mentioned.

The name of the chief was sometimes Mbungu, sometimes Makula, sometimes Malisaka; and he could not repress a smile on my suggesting that he had a fourth, as he really had—and that he was not perhaps the real man after all. The relations of the mission party with the people on the Rombashe were perfectly friendly for the first eight days. The chief sent us an ox and various other presents, and these were acknowledged by return presents from the ship. After that some difficulty arose which has never been satisfactorily explained, but a collision was avoided.

From the first, however, a considerable diversity of opinion existed

between Captain Elton and myself as to the character of these people. They were the wildest looking savages we had yet met. The men wore not a vestige of clothing, and many of them had their bodies smeared with black, white, and red paint, which gave them a most hideous appearance. The women, however, were better cared for than among many other tribes. Captain Elton's view was that they were an exceedingly simple and unsophisticated people. Their subsequent dealings with him did not verify this. They declared themselves unwilling to carry any burdens; asserted that they were warriors and not porters; but if porters were wanted they would try and get some from the hills behind. They reduced the loads which they did accept from 60 to 20 lbs., insisted on making their own stages, and the day after the start the greater number of them deserted. In consequence of this difficulty, Captain Elton sent back even from his camp on the river, a large quantity of stores and material intended for the journey, for which carriers could not be found. We saw with astonishment several boatloads of stores and provisions returned, to go back with the ship. These included such essentials as biscuits, coffee, sugar, flour, candles, sardines, oatmeal, pepper, a variety of pots and pans, water buckets, and numerous other articles. There were also guns and ammunition. It was in vain that we remonstrated and pointed out the danger that would arise from this arrangement. We produced no impression. On Wednesday, the 17th October, at noon, Captain Elton's expedition started for the Zanzibar coast. We beheld them depart with the gloomiest forebodings, though little was said, as there seemed to be a fixed determination to carry out the projected journey. We thought they would encounter serious difficulties from the character of the people among whom we had come, and also that scarcity, if not starvation, must overtake them. All this unfortunately was more or less realised; and the death of Captain Elton has thrown a gloom over the whole journey. It is impossible to speak of him as an explorer, except in terms of the highest admiration and eulogy. His activity, energy, wonderful tact, determination, courage, and perseverance, all fitted him remarkably for the work he had chosen.

From whatever cause, our relations with the Chungus were getting a little strained. I do not wish to express any theory on this subject, though I hold one. It is enough to say that after we did discover the state of matters we were in no hurry, but remained three full days; and in reply to the inquiry when we should depart, I stated that we should go when we found it convenient. Our most trusty headman held very strong views on this subject, and refused to go with me through the country, and generally indicated that we ought not to protract our stay. I was exceedingly anxious to avoid anything approaching even to a collision, though we were well armed and ready for any attack; but so little display did we make of arms, that I think the natives believed we had none at all. There was not the slightest reason why we should

have had any fear. We were in an iron ship, in a deep river, within 2 miles of the broad lake itself. We had sixty barrels ready, and nothing but the extreme anxiety not to leave a wrong impression on the minds of these poor people led us to act as we did, though strangely enough we have been accused of panic and flight. We had no objection to fighting *per se*, and if it were necessary for dear life. But every reason induced us to try a pacific method; accordingly after waiting three days, or in all ten, we steamed out of the Rombashe on the evening of the 21st October, and held on by the clear light of a full moon and on a glassy sea till about midnight, when the *Ilala* quietly glided again into the lagoon of the Kambwe.

Eight days were spent in this harbour. The people were exceedingly friendly, especially the old chief Kalonga, who brought us as a present a young bull and a tusk of ivory. The ivory was meant to induce us to give him medicine, or *mankwala*, to fight the *Maviti*.* We told him the English had no medicine except courage to fight their enemies with, and we declined to take the tusk of ivory he brought, because we would not deceive him by giving him a useless medicine in return.

Resuming our homeward voyage, for 20 miles south of the Kambwe we found the shore low, well wooded at intervals, with belts of Palmyra palms stretching inland for some distance. The coast itself consisted of miles of sandy beach, occasionally interrupted with reedy patches. Groups of people were observed from place to place looking at the steamer, and villages were seen at frequent intervals.

Twenty miles still further south the low undulating hills gradually increased in height, and approached the shore till they formed the prominent headland south of which lies the indentation to which we gave the name of "Deep Bay"; 8 or 9 miles further south lies Florence Bay.

The coast for 55 or 60 miles south of Florence Bay, as already described, is steep; rounded hills from 1500 feet to 2000 feet and upwards come close to the edge of the lake. The openings in this line of hills are too slight to form good harbours, and those tried were found to be rocky at the bottom, with deep water close inshore. An exception must be made in reference to Kuta Bay, about 30 miles south of Florence Bay. The people gathered in large numbers as the ship dropped anchor; there were numerous villages on the shore; many of the people wore good native cloth, and clothing generally was the rule. In this they offered a great contrast to the perfectly nude dwellers on the Rombashe. They file their teeth, wear large peles or lip-rings, and large ornaments in their ears; beads also were apparently plentiful.

There were numerous canoes, and long stretches of hundreds of yards of excellent fishing-nets drying on stakes on the beach. The people

* Called by Dr. Laws, in the paper following this, Mangone.—Ed.

seemed tolerably well off, but here as elsewhere the dread of the Maviti beclouded their lives, and they had converted a rocky island, separated from the mainland by a channel about 100 yards wide, into a granary. Every square yard of its broken surface was covered with rude conical huts forming grain stores. A small number of people were also living on the island. Three miles north of the village of Kuta, there lies a curious mass of rock called by the natives Bowe; and close by, a small stream called the Furunika falls into the lake. The people were perfectly friendly, and the headman sent a goat after us, a whole day's journey down the coast.

Twenty miles south of Kuta Bay the coast-line gradually opens out into a pleasant valley, and forms two small bays with fairly good anchorage, to which we gave the name of "Double Bay." There were two or three villages, but they were deserted. Three men were seen on the shore. I went off to meet them, and try and induce them to come on board with us, and show us Mankambira's village. Greatly to my surprise I succeeded, and at sunset the same evening the *Ilala* anchored off the Lucia River, in front of Mankambira's town. A crowd of two or three thousand people assembled on the beach to watch the steamer coming in.

Next morning we visited Mankambira. His friendliness and impatience were equally manifested by his sending off in a canoe, the previous night at ten o'clock, some bananas and pombe, or native beer. We found him surrounded by his headmen under a temporary shade, erected on the beach. He is a tall, spare man, of about seventy, with a quiet and somewhat dignified manner; but, judging from his voice at times, I should think both temper and energy were concealed under that quiet manner. Our meeting lasted a considerable time. We made the usual statements about the English and their objects, and specially those of the Mission; said we had often heard of the chief Mankambira, and that he seemed more like an old friend than a stranger. We gave him a handsome present. This contained, among other things, a good dressing-gown, of light but brilliant material, which apparently pleased him greatly. He put it on, and wore it during our stay. His town was very large, and contained a vast number of temporary huts (*msasas*), occupied by people driven in from the surrounding villages by the war with the Maviti. A double, and at some places a triple stockade, several miles in length, surrounded the town. Several days were spent in wooding, and various conferences were held with Mankambira. The conversation always converged to the point whether we would give him *mankwala*, or medicine, to destroy his enemies, the Maviti.

At this place I left the ship, for the purpose of making a journey on foot down the middle section of the lake shores. My object was to examine the coast-line, with the view of ascertaining whether it offered any more advantageous site and harbour for the Livingstonia Station

than the one at present occupied. The distance traversed was 100 miles of latitude; but the necessity of one time going inland and at other times approaching the coast, made the distance actually travelled a great deal more. Dr. Laws was to take the ship to Kota-Kota, wood there, and wait my arrival. I had no white man with me, but two or three faithfuls in William Koyi from Lovedale, Sam and Chimlolo from Livingstonia, and about ten native carriers.

We left at noon on the 6th November, and early in the afternoon arrived at Marenga's village, on the southern side of the point of land called Misangi Point, which forms the southern projection of Mankambira's Bay. This village also was surrounded by a triple stockade of enormous strength. The distance between the stockades was from 30 to 60 yards, and at certain places the interval was filled up by growing jungle. We made our way through one narrow opening after another till we had passed the third barrier.

Numbers of people came to look at us, and I sent a messenger to Marenga to say I had come to see him, and wanted to stay all night in his town. No message arriving, and the darkness beginning to set in, I directed the men to set up the small tent we carried with us. We set a watch, and slept comfortably and quietly among these beleaguered Anjanja. Next morning Marenga came with his brother to see us, after having previously sent a large present of pombe and fowls.

We had the usual talk for an hour, and I then started on the march southwards. It is impossible not to feel the sincerest pity and commiseration for these poor people. They are kindly and hospitable in their own rude way, more hospitable to strangers than I fear we ourselves are, or should be to them, were they to come amongst us unrecommended as we did. But whether the times be quiet or troubled, in European cities, or in triply stockaded villages on the shores of Lake Nyassa, human life goes on in certain fixed daily forms.

As we passed along through this town built amongst jungle growing to the very doors, the men and women were all busily engaged at their morning occupations, and the children running about at their play. Some were clearing the ground for new temporary huts, and others were erecting these fragile dwellings. Some women were grinding the *ufa* or cassava meal, and others drying it, and at the door of one hut a woman was seen seated quietly suckling her infant. Provisions did not seem scarce, pombe evidently was abundant, and though besieged, the inhabitants were evidently holding their own.

We continued our march till noon, when we reached a village with a double stockade, belonging to a headman called Katonga. The people here might be said to be almost driven into the lake by their relentless foes, the Maviti. The stockades ran thirty yards into the lake itself, and the greater number of the huts were actually built on the sandy beach. In the evening we reached the valley of the Luvno, or Ruvno—which is

a rich but swampy plain 4 to 5 miles broad. In the wet season it must be wet enough. Something of the humidity of its soil may be gathered from the fact that in this driest and most parched season of the year, we passed through more than one field of maize in ear, tall and strong, and fresh looking. We found here the village of Kanyende, also stockaded, half hidden in a grove of large trees, and halted for the night under the shade of some of them outside the stockade.

The valley of the Ruvno, though small, is wonderfully beautiful, and better days are surely in store for it, when peace and order shall reign instead of constant war and turmoil. Through this valley, there is probably a good entrance into the country to the west.

Four hours' march, partly over slight hillocks with light sandy soil, brought us to Jua's village, close to the lake. We passed a good many small streams, some of which drain into the valley of the Ruvno, and others flow into the lake:—1. Tiaga, small and reedy; 2. Lifupa, 10 to 12 feet broad, and reedy; 3. Kungwe, 15 to 20 feet broad, sandy bed, scarcely 6 inches of water, water itself very good and sweet; 4. Kadura; 5. Vuma.

We found Jua's village in the same condition as the two just described. We started again at 2 o'clock, rounded the base of the prominent mountain Kawirwiri, or Kowirwi. The lower slopes of this mountain, though somewhat rough, present landscapes of great beauty.

We camped in the woods, and started before daybreak next morning for the longest and most trying day's march of the journey. The greater part of the way led us through deep sand close to the beach. At 10.30 we crossed the Luambaze, which at its mouth we found to be a stream about 2 feet deep and 30 feet broad. The mouth is obstructed by a bar, inside of which there was a greater depth and breadth of water. We camped at noon behind a rocky promontory, whose name I could not ascertain, but which is conspicuous by a solitary Palmyra palm, behind which lies a large lagoon. Here we found two hot springs, of a temperature of about 180°. The water is clear and good and pleasant to taste, not sulphurous, and perhaps slightly chalybeate.

The following day brought us to the banks of the Loangwa. This is the largest river we have passed; probably the largest between this and the extreme northern end of the lake. Where we crossed it, at some short distance from the mouth, the breadth of the channel was about 70 yards, bottom sandy and level, with many reedy islands; the water at this period was only knee deep, but a vast volume, from the appearance of the banks, undoubtedly fills its channels in the wet season.

Leaving the Loangwa and proceeding southwards, we crossed a considerable plain lying between the path and the lake. It is 6 or 8 miles long. During the day we crossed numerous small streams: the Kambisa, the Kwalezi, Kabula, Mapanda, the Machete, Chikalo, Ka-Kumbi, Inyi.

Tuesday, 13th November, was our last day's march before reaching

Kota-Kota. We left our camp at 6.30, and struck inland, ascending to about 400 or 500 feet, and at 8.30 we looked down into the valley of the Bambarre, a small stream which falls into the Sinjeri. At 9 o'clock, we reached the Bua River at its confluence with the Sinjeri. This latter is a brisk-flowing stream 15 to 18 feet wide, with 5 or 6 feet of water in the wet season, but only a foot to a foot and a half in depth when we crossed it. The channel of the Bua is 60 yards wide, with level and sandy bed, the water in the dry season is knee to waist deep, the banks steep and high: judging by water-marks, the depth must be 12 to 18 feet when the river is in flood.

There we made a long halt to rest and roast two wild pigs that had been shot, and at 12.30 started again. An unsuccessful chase after a herd of buffalo immediately after crossing the river varied the commencement of the march.

At 3.30 we crossed the Kasangazi, a stream with its channel deeply sunk between high banks, but which was completely overshadowed by tall trees and overarching palms, which met above, and formed the coolest and most delightful resting-place which the fancy or imagination of wearied travellers in the torrid climate of Africa could picture or desire. There was cool water to drink, and plenty of room to walk about in the shade, and gentle slopes on which to rest, untouched by a single ray of the burning sun. We halted for forty-five minutes, but would gladly have stayed forty-five hours. It was necessary to reach Kota-Kota, and this we accomplished by 8.30 in the evening, the last two hours of the march being performed in the moonlight.

From the height above the village we saw the *Ilala* lying quietly at anchor some short distance from the shore, and walked through the town of Kota-Kota as quietly as possible, to avoid the noise of the idle and curious crowd which always gathers on the arrival of travellers, by day or night. We hailed the ship, and got a prompt response; paid our porters, and gave them a little present; went on board, and were glad to find Dr. Laws and all with him in fairly good health, though there had been a little fever.

Next morning we paid a farewell, and very pleasant, visit to the Jumbe. The friendly relations of Jumbe with our people seem to have continued uninterrupted till last October, when a change came over his feelings. By the latest news he had suddenly altered, and this alteration coincided in date with the arrival of certain Arab traders from the coast, who probably wrought on his fears, and filled his mind with falsehoods.

Arab traders, however friendly and helpful they may have been at times to individual travellers, even of our own nation, have been an unspeakable curse to Africa. Their footsteps may generally be tracked in blood and fire, and in the tears and misery of the unhappy natives; and their policy or method consists essentially in the obstruction of

everything which interferes with their diabolical traffic. Even giving them full credit for all the assistance they have occasionally afforded, Central Africa has no worse enemy than the Arab trader.

From Lake Chia we sailed southwards, and after one long day's steaming arrived, shortly after dark, at Livingstonia on the 16th November, to the great relief of our friends there, and to find that a party had been despatched in search of us under Mr. James Stewart, C.E., the storm that had nearly proved fatal to us, having been felt with great severity at the south end of the lake.

Conclusion.—Regular steam communication on any of the African lakes will be admitted to be a valuable factor in the civilisation of these regions. Before our journey there was a doubt whether the voyage to the northern end of Nyassa could be undertaken with regularity and safety. That question depended on the discovery of one or more practicable harbours, and on the character of the country and people round the northern end. Previous to our voyage nothing definite was known on these points, but all doubts are now dispelled.

By the discovery of the Kambwe Lagoon and the Rombashe River, in addition to the other intermediate harbours on the western shore, communication may be regarded as now open, and shortly the distance will probably be accomplished in forty-five to fifty hours, instead of ten days or two weeks as formerly, when we were groping our way through unknown waters.

Though not exactly asserted, it would appear as if the geographical results of this voyage were claimed by the exploring expedition whom we conveyed. But I claim the discovery of the Rombashe on behalf of the Livingstonia Mission, the river having been first sighted at a distance by Mr. Young in 1876, and first entered by us in October, 1877, up to which time its name even was unknown. Along with this there is the discovery of the Kambwe Lagoon, five hours' voyage further south, which will afford, equally with the Rombashe, safe anchorage in time to come.

I wish to bespeak the favour of this influential Society on behalf of the efforts of our missionaries generally to make us better acquainted with the geography of Africa. By the labours of this humbler class of explorers, whose investigations are carried on for immediate practical purposes connected with the civilisation and christianisation of the country, the details of large areas, amounting to hundreds of miles, are gradually and accurately laid down; previous errors are corrected; and by patient and continued observation, large blank surfaces are filled up with as much accuracy as human effort and instruments can effect. Our own Livingstonia Mission has already in part, and will shortly have, I hope, the entire region lying on both shores of Lake Nyassa carefully observed and the map completed. At the commencement, Mr. Young took up the work left by Dr. Livingstone. It has since been and is now being further carried out by Dr. Laws and Mr. Stewart, C.E.

Men connected with these humbler expeditions need a little encouragement. Some of them do not enter the country merely for a time. They give, so far, their entire lives to it. They nail the flag to the mast, and frequently refuse to lower it till the mast itself comes down.

I notice that an extensive scheme or programme for the development of the Lake Nyassa region has been laid before another important Society in London. It is merely a proposal as yet, but its main features are, the placing of steam launches or larger steamers on the River Shire and Lake Nyassa, and, I suppose, the formation of a company to effect this. The training of elephants at this stage, though important, can hardly be regarded as an essential factor in the progress of African civilisation. Regarding this scheme I have simply to say, if it is intended as an original proposal:—It is too late. The thing is already done. The difficult feat of making the egg to stand on its end is already accomplished.

Such as it is, steam navigation already exists by the *Lady Nyassa* on the Lower Zambesi, and by the *Ilala* on Lake Nyassa. This latter vessel will probably be replaced shortly by one still larger. There is only one broken link in the chain of communication now between the London docks and the Rombashe—that is, the 70 miles of the Murchison Cataracts on the Shiré. By the steam-packets of the Union Company or the British India Company, it is possible to sail now from this country to Zanzibar or Quilimane, and thence, by the two small vessels already mentioned, to the north end of Lake Nyassa. Five years ago the journey on the river and lake had to be made by canoes. This is one of the fruits of the Livingstonia Mission.

But I wish to connect the work of the Royal Geographical Society with the doings of the Livingstonia Mission in accomplishing these results, thus: There was a time when Lake Nyassa was a name merely—nothing more than an ill-defined and uncertain sheet of water on the map of the African continent. The Society's labours, by encouraging geographical research, tended to dissipate that uncertainty, and promote a striving after precision and accuracy in further efforts. These, again, were linked on to more direct enterprises, of a civilising and a christianising kind. And the result is, the existence of a European settlement, regular communication, and the presence of the merchant and the missionary round the shores of a lake, of which five years ago even the northern termination was unknown.

Journey along Part of the Western Side of Lake Nyassa, in 1878.

By the Rev. Dr. LAWS.*

(Extracts read, by Mr. James Stevenson, at the Evening Meeting, March 10th, 1879.)

Map, p. 352.†

AGREEABLY to the instructions left by Dr. James Stewart, that should he not be able to return to Lake Nyassa before August, 1878, we were to proceed along the west side of the lake, for the purpose of learning more about the nature of the country and its inhabitants, but chiefly with the view of finding, if possible, a better site for Livingstonia than its present one, we undertook the journey of which we submit the following Report.

Our party consisted of Mr. James Stewart, C.E., Wm. Koyi, Fred. Zarakuti, and myself, accompanied by forty-five natives. Leaving Cape Maclear in the *Ilala* on the morning of Monday, 12th August, 1878, we disembarked our goods and native porters on the western shore of the lake, at the point furthest south where there was a dry beach available for a camp. Next morning our march began. We crossed the plain in a south-westerly direction to the foot of the mountains, and camped beside the River Monkokwe, which, as also its northern neighbour, the River Mua, comes tumbling in a waterfall, over a rocky ledge, from the hill above. Here it is about 3 yards wide, and a foot deep, while the water is so cold, compared with that of the lake, we were glad to get speedily out of our bath.

For several miles north of the Monkokwe, along the foot of the mountains, the soil is fair, and very damp, some places being quite swampy. In these damp spots green maize was growing several feet high, while on the drier ground near, the stalks of the old crop were strewn upon the ground. Huts are scattered here and there among these gardens; while on the southern side of the River Monkokwe stands a pretty large village, inhabited chiefly by the Anyanja, who are subject to the Mangone,‡ whose habits and customs they imitate. The villagers had plenty of food, and readily brought maize for sale. Several women were seen carrying baskets full of the cotton pod from their gardens, and from which cotton they weave a strong, coarse cloth.

Accompanied by two guides, on the 15th we ascended the mountains, by a footpath along which there is evidently a good deal of traffic, as shown by our meeting several parties of the Mangone coming down the

* Abridged from the Report sent by Dr. Laws to the Directors of the Livingstonia Mission.

† This map, with the exception of the inset in the corner and the eastern coast-line, is from the original drawing by Mr. James Stewart, C.E., who accompanied Dr. Laws. The copyright belongs to the Livingstonia Mission Committee, who have kindly allowed the Society the use of it for the present publication.

‡ A people of Zulu descent.

hills. A short climb brought us to the top of a low ridge, which abruptly bounds the plain below, and led us by a gradual ascent to the real base of the mountains. Here the hard work began. The path became steeper as we ascended, until it was little else than a ladder, the roots of trees forming the successive steps. Progress was necessarily slow : frequent rests being required by men with their burdens on their heads, who were panting with the exertion of a climb which required them to hold on by branches of trees, or anything else that would help them over the worst places of the road. Water is plentiful along the path, issuing in little rills from the rocky crevices by the way. Trees of various kinds occupy the top of the lower ridge and the mountain sides. Few are of large size, most being from 12 to 15 feet high, and 6 or 8 inches in diameter, but crooked, and ill-suited for building purposes. Far up the mountains the masuku (the building timber at Blantyre) is found, but its size is small, and at the higher elevations it becomes a scraggy bush. The atmosphere changes perceptibly, from a close haze below, to the clear bracing air, blowing as a keen wind on the mountain top. Here there are great rounded shoulders to the hills, and among these the path winds till the village of Bembeke is reached.

Next morning after a short climb we were on the border of a wide table-land. Here the bare granite rock is exposed, and we walked a long way over it. The road passed the southern side of a large peak, called Ngoma. It is a gigantic granite rock, with a scraggy bush growing here and there in the cracks on its surface. We ascended about 400 feet for the purpose of getting bearings, and while doing so found that after getting rid of revolvers and guns, owing to local attraction, the compass bearing of a distant object taken at two points not 100 feet apart differed 25° . By taking an azimuth, Mr. Stewart was able to eliminate the error.

The haze having cleared away considerably, we were able to get a good view of the southern part of the lake, and this is the best point from which to describe it. North and south of us runs a range of mountains (Kirk's Range). To the north the range is broken by the Lintippe Valley; while to the south it extends with a slight bend to the eastward to the River Shiré, at the lower end of the Murchison Cataracts. Mount Chirobwe is probably the highest peak to the south of us, and beyond it the altitude decreases, until there seem to be but hummocky hills in the distance.

To the west is a table-land, extending to the horizon, and bounded on its eastern side by hills, which, viewed from the lake, are the peaks of the mountains on which we stand. The vast plain is bare and treeless, with gentle undulations breaking its monotony, while here and there craggy granite peaks rise from the plain, giving a wild and weird appearance to the landscape.

On the eastern side, facing the lake, these mountains present an

imposing appearance as they rise steeply from the plain below. Some distance north of the River Monkokwe, at from 100 to 200 feet up the mountain side, a break occurs, forming a sort of terrace, which, at the part we crossed, was about 2 miles wide, broadening southward to 10 or 15 miles, and further south becoming part of the lake plain, its border being marked by a few small hills. This terrace is covered by small-sized trees, and to the southwards, a green wavy line across it indicates the course of the River Livleze, along which are several Mangone villages, surrounded, we are told, by fertile gardens.

Looking across the lake, we see that its eastern shore is bounded by a similar range of mountains to the western, and which, continued in a southerly direction to Mount Zomba, forms the eastern boundary of Lake Pamalomba, and the upper Shiré valley. The gigantic trough, as we might consider the space between these mountain ranges, forms the basin of Lake Nyassa; and if we think of the bottom as gradually rising, until at the south end it becomes the bank a few feet above the lake surface, and is then continued southwards, until in the distance it is bounded by the hills; we have the great plain of Malomba, with its lake (mlinga) Pamalomba (Pa = at; Malomba). About the middle of its breadth, and at what would otherwise be the northern side of this plain, a hilly promontory juts northward into the lake terminated by the rocky mountains Mwana Kungune and Kungune, off which lie the islands of Domwe and Tambi. This is Cape Maclear, and on the small plain between these two mountains is our mission station, with its beautiful bay easily traceable at this distance.

Our road to Chikuse's village lay in a south-westerly direction across this table-land, passing some distance south of Mount Deza. Several villages—one or two large-sized—are near the mountain peaks, while miles of old gardens, now laid waste, speak of the number and industry of the Akamtunda (a section of the Anyanja), who formerly lived here, but were driven out by the Mangone. After crossing a slight ridge, we came to the River Livubwe, here a small stream, which rises on the southern side of Mount Deza. A little further on it is joined by a larger stream, the River Maere. In the afternoon we reached the village of Chikuse, as the chief of the Mangone in this quarter is called. We remained here four days. The Mangone were very suspicious of us at first, dreading we might bewitch their village. Their headman asked us whether any evil, such as sickness or death, would come to their village on account of our visit; and if when we went away we would take all our spirits with us, and not leave even one to plague them after our departure. We repudiated all connection with medicines, other than those we employed in the treatment of sickness. Chikuse himself paid us a state visit on the 19th.

Most of the Mangone are grey-haired aged men, with faces showing intelligence and determination, but most have a cunning leer about

their eyes, giving an air of suspicion to their character. A few wear their hair dressed like a silk hat, without the brim, and having a ring of indiarubber sewn round its upper edge in place of a crown. Chikuse himself is tall, excessively corpulent, and has a bloated, sensual cast of countenance. These characteristics are common to most of the members of his family whom we saw.

The country is open and bare, having a general incline southward from Mount Deza. The soil here is of disintegrated granite, and maize is the chief crop grown; while the damp hollows between the ridges, which are the gathering ground for the many streams in this well-watered country, produce a good supply of grass, and are the pasture grounds of the villages. We saw twenty head of cattle at Chikuse's, and more at outlying villages. Goats are plentiful, sheep not so numerous. The people do not seem to rear fowls in such numbers as they do on the shores of the lake, and at night the ridges were illuminated by the moving torches of parties out rat-hunting.

The village of the head chief is not so large as a head village on the lake usually is, but the other villages are dotted about the slopes so thickly, that it is evident the country is densely populated. The majority of the fighting men of the tribe, armed with shields, spears, and tomahawks, seemed to be stationed in the outlying villages, comparatively few being in the main village. The clothing of the people is scanty in the extreme. The men wear a small skin, or bunch of feathers, with rings of hide on their legs and arms; the women usually a piece of bark cloth. Some are the fortunate possessors of a fathom of cotton cloth, a yard wide. These cloths are of native manufacture, rough, strong, and durable.

Owing to the cold, bracing climate, the people are lithe and active; the young men going whooping and whistling about the village with the agility of wild cats. The traffic from village to village, and to the shores of the lake, is very extensive. At one place we counted eight footpaths running parallel with each other.

The general elevation of the district may be reckoned at 4700 feet above sea-level, Chikuse's village being lower than this. Though thus elevated, there does not seem to be the same tendency to misty clouds floating about, as there is on the sides of high mountains. This is probably due to the wide extent of country over which the winds pass, meeting with few obstructions. The great defect of the country is the absence of trees, the natives having to dig maize roots for fuel.

We left Chikuse's village on the 20th, and passed the large village of Chifisi (formerly called Gaomazi), another Mangone chief. The territory of this chief extends northward to that of Tambala; a strip of uninhabited country, which it took us rather more than two days to cross, lying between. At Mount Deza, three separate rivers take their rise; the Livubwe on the south side, flowing southwards to the

Zambesi near Tete; the Leize on the north side, which flows into Lake Nyassa, south of Mpemba's village; and the River Lintippe, the largest of the three, which, rising on its western side, flows first for a few miles southward, and then circling westward, northward, and eastward, flows into Lake Nyassa opposite Malere Island. We camped one night on the side of Mount Deza, by the Lintippe, already a brawling stream, and there, at an elevation of 5000 feet, were visited for an hour or two by mosquitos, but the cold of midnight drove them all away.

Crossing the watershed between the Lintippe and the Leize, the country is covered with shrubs, representing the trees of lower altitudes. Many of these have copper-coloured leaves, and masuku is found in abundance, but seldom attaining a greater height than 10 feet.

We passed one large and several smaller villages, inhabited by Akamtunda. Soon after leaving the inhabited district the nature of the country changes, and we are again climbing granite rocks, black and bare. A few miles further on we come to the place where Mlenga's village stood when Mr. Cotterill visited him in 1877. A Mangone raid had obliged him to retire towards the more rugged country beyond. We were now on Tambala's territory, and near a small village belonging to him we camped, at an elevation of 4000 feet above sea-level.

Tambala himself was away on an ivory-trading expedition to the country of the Awisa, and Mlenga was in charge of the place in his absence. We found him a frank, outspoken man, perhaps thirty-five or forty years of age. He is an Ajawa, and so also are most of the people under him, although one or two of the old Anyanja are to be found here.

From Tambala's to the Lintippe was a march up and down steep hills. We crossed several streams in the hollows, all being feeders of the Lintippe. The last of these we crossed is named the Goma, which flows in a glen whose rocky sides were covered by splendid bamboos, so interlaced as to give our men considerable difficulty in passing their burdens along. The Goma flows in a rocky bed, and looking down it we see the Lintippe crossing the mouth of the glen at right angles. When in flood it would present a beautiful waterfall 20 or 30 feet high, where it joins the Lintippe.

The River Lintippe itself is disappointing. It has a dirty, slimy appearance, flowing among great rocky boulders enclosed by crags, often precipitous rocks 100 to 200 feet high, and hills rising a good deal higher. For purposes of irrigation it is here quite useless, and though its flow may be rapid enough in some places, it is irregular, and the pools between the weed-covered rocks have usually a muddy bottom, and patches of reeds grow along the margins. Several fishermen were here with their families busy at work. Weirs are thrown across the most available places in the stream, and in these fish-baskets are placed. After climbing the rugged hills bordering the Lintippe, travelling

became easier. A well-beaten path led towards Mount Dimba, while an old discarded slave yoke spoke of the traffic. This district of the country is called Chipeta. A short march after leaving Mount Dimba brought us to the River Dilongwe, a branch of the Lintippe, after crossing which we passed through a stretch of country and many villages on the way to the village of the chief Chiwere.

The original Mangone are much more numerous here than around Chikuse. Tall and erect, with a haughtiness at times bordering on insolence, and at the same time extremely superstitious, they have quite a military bearing; but their manners showed a courtesy and politeness not usually displayed by the natives of the lake.

After a not very satisfactory interview with Chiwere's headman, and procuring guides, we started on the road to Kota-Kota.

At this the most westerly point of our journey, the country is more pleasant in appearance than at Chikuse's. Ranges of rounded hills, with wide valleys between, give greater variety to the scene than further south, while the granite crags are entirely absent. Water is plentiful, and most of it of good quality. In the damp hollows we saw acres of peas in bloom, and found they are a staple commodity of the district, the natives having large stores of them. We could not distinguish them from the English pea, and found their quality excellent. At all the villages, storehouses (*mankokwe*) of maize were found, telling of a soil yielding a fair return. The people are said to have cattle, though we did not see them. Sheep and goats they have in abundance. The altitude is about 4200 feet, with cool bracing air. I think the whole district is healthy. Its great defect is the want of trees; only a few are scattered about in small clumps. Villages are thickly planted on the slopes of the ridges, and the population is pretty large. The people are poorly clad, the men wearing generally two small monkey-skin aprons, or a girdle of hide with a thick fringe of bark twine hanging from it. Women wear bark cloth, but it seems to be scarce in the district. Buaze we saw growing plentifully at several places on the way, and once we saw a native loom at work making it into cloth. The cloth is hard, strong, and durable. Nowhere else have we seen buaze used for such a purpose, its fibre being held in so much repute for fishing-nets as to lead to its being used up in their manufacture.

About 10 miles from Chiwere's, at about the elevation of Blantyre, and on the borders of a tree-growing district, we passed the end of what looked a pretty valley, sloping gently from the higher hills called Kabutu. The soil seems fertile, and a stream of good water flows from it. As there is a large population near, this place may yet prove useful as a mission station, but it would require a more careful survey before coming to a decision.

A few miles further brought us to the last of Chiwere's villages. From this point until we reached the entrance of Lake Chia, there is not

a single village. The road seems to be one of the main roads leading into the interior, is on the whole good, is well selected, along ridges gradually descending to the shore plains, and shows a good deal of traffic along its course.

A thick, smoky haze hanging about everywhere, especially towards the lake, limited our view. The country through which we passed in the first place is chiefly a succession of tree-covered, hilly regions. Many of the trees are of a softish wood, tall and straight, but of a small diameter. This kind does not seem to suffer so much from insects here as it does at Livingstonia. Just before leaving the hills, we entered on an arid part and had to march about 10 miles before we reached water. A sandy ridge borders the lake for a long way, indeed from about west of Benje Island to Sani Hill. From this ridge, westward, a plain extends to the base of the mountains, a distance of several miles. A depression in this plain below the level of Lake Nyassa forms Lake Chia, connected with Nyassa by a rocky channel. A belt of papyrus extends round Lake Chia, which from its great breadth, at the southern end, gives one the idea of its being gradually filled up. The general depth of Lake Chia is 13 feet, shallowing to 7 feet at the extremities, and deepening to fully 3 fathoms at the passage.

In the country through which we have been passing since leaving the lake, game of every description has been very scarce. We only once saw an elephant to the north of Mount Deza, and at the same place a herd of eight elands. Probably the dried-up pasture in the uninhabited districts has driven them to the lower grounds for food, as tracks are numerous, and we walked for miles along elephant paths. Indeed, these are the best roads in the country.

From Lake Chia to Sani Hill the path winds through a succession of cassava gardens, having a bare and sandy soil. In some of the damper parts rice is grown. We crossed the eastern shoulder of Sani, and found that it had been denuded of most of its good trees for the purpose of dhow-building. We had a bath in a rocky basin near one of the hot springs, on the south side of Kota-Kota, into which hot and cold water both flowed. A number of small fishes were in the pool, but they kept as much as possible among the cold water below, making rapid darts to the surface to secure their prey, and then sinking at once. Several of these springs come bubbling to the surface with their water at a higher temperature than could be comfortably borne by the hand.

On drawing near Kota-Kota, Jumbe came out to meet us, accompanied by several of his men. He is the third bearing that title. With regard to our projected journey, he told us there was war going on between Mankambira and Chipatula, and that our journey to Chipatula would most likely be a dangerous one.

On the previous morning, Mr. Rhodes' boat passed Kota-Kota. Hearing afterwards from some fishermen of our being there, he landed and

came to see us, bringing a lump of coal, which he had found at a place south of Florence Bay. He reports the seam from which it was taken as being from 5 to 6 feet thick, and another small one beside it. It was, indeed, a glad sight to us, and will work wonders for this district, if the coal area be at all extensive. William Koyi, on seeing the piece of coal, said that while we were lying in Florence Bay, last year, he had found some mineral closely resembling this in one of the gullies of Mount Waller. It broke readily, but he did not get it to burn.

On the 9th we resumed our journey, having got some men from Jumbe to carry several loads as far as Marcnga's village. Jumbe and several of his councillors accompanied us some distance from the village, apparently parading our friendship before his people. As we wanted to know whether any harbour could be found for the *Ilala* along this coast, we struck down towards the River Bua, which is shallow, and about 15 yards wide at present, but which during the rainy season must bring down a large quantity of water. The plain through which it flows is at places very fertile, but at others quite poor, being of the blue clay common to all this part of Africa where marsh is to be found. We reached the lake shore some distance north of this, after passing round the edge of a large papyrus swamp.

From this point, until we reached Mount Kowirwi, we kept along the lake shore, mostly on the sand. Nearly all the way a plain of rough gravel skirts the lake, with long grass growing in scattered tufts. Here and there a Palmyra palm and some other trees are found, but they are few. Elephants and smaller game roam across the plain, but only at two places were there any people found. We were able to wade across the mouth of the Loangwa, it is so shallow. Mr. Stewart and I went up some distance in a canoe; but it is so full of the nests of a fish called zambo, that we were obliged to turn back, on the canoe repeatedly grounding. These nests are circular pits hollowed in the sand, and surrounded by a ridge. In diameter they varied from 18 inches to 6 feet, and are usually 18 inches deep.

At lat. 12° 24' 6" S., by an observation taken by Mr. Stewart, we found a large lagoon named Unaka, bounded by a low reedy marsh, and open to the lake by a large and a small passage. We got a canoe, and examined part of it, and found a general depth of 7 feet of water. On the bar, however, the most we got was 3 or 4 feet, and this by a tortuous passage. Only in the rainy season, when the lake level is high, would there be water enough for the *Ilala*. As a permanent harbour it is further unsuitable, from the surrounding marsh rendering it unhealthy.

From Mount Kowirwi on to Marenga's, a strip of fertile land, varying in breadth from $1\frac{1}{2}$ to several miles, skirts the lake. Some good trees are scattered along it. There are many gardens under cultivation, and many more which the unsettled state of the country has laid waste. At Kowirwi itself a few scattered hamlets are perched on the mountain

sides; further on the natives, for the sake of shelter, have built their houses on a marshy island, to which they go in canoes. Maize and mapira have been, and are grown, but cassava is the chief article in the gardens. Its presence is not always to be taken as the index of a poor soil, but as being the sign of a terror-stricken country. Maize and other cereals, ripening at a certain season, can be carried off by an enemy, and the inhabitants left to starve; while cassava is a crop coming more gradually to maturity, and which, once set agoing, is likely to afford some ripe tubers at all seasons, while others which are not ready afford no temptation to robbers.

Several streams flow into the lake along this coast, but at the present season are nearly all blocked up at the mouth by a barrier of sand. Frequently they run parallel with the lake shore for some distance, and these places the natives take advantage of as places of safety, by building a stockade across the sandspit.

Most of the villages in this quarter are stockaded, and Marenga's (visited by Dr. Stewart in 1877), which we reached on the evening of the 16th, is the strongest of these. A small lagoon led Mr. Stewart and me down to the coast to examine it, but we found it too shallow to be of service. Near it, however, we found two small bays, side by side. The southern one, which seems the best, is well protected from the south wind by a bold headland, and may on further examination be found serviceable. There are some rocks in it, and others just outside it, so that without a more careful inspection we cannot say much about it. After passing through some more gardens, we were again on the beach, and along it we marched until we camped a mile or so on the north side of the River Luciea. Wednesday, 19th, we spent examining the Luciea. We were encamped between two lines of stockade, at the northern side of the village, in fact on a bar of sand separating a sheet of water behind from the lake. This place looks as if the Luciea had at one time flowed into the lake here, and we were told that in the rainy season it communicates with the lake. Going in a canoe Mr. Stewart and I found it had a depth of about 18 feet, and that its branches extend in several directions, ending however in an abrupt bank, with a shallow stream running into it. There is one communication with the Luciea itself through reeds. We went a mile or two up the river, and found in many places over 10 feet of water; and we were told canoes could go up for three days, a distance which owing to the windings of the river can be travelled by land in one day. The bar at the mouth is a great obstacle, having only 18 inches water on it. For some distance inside it, in the dry season, there is only 4 feet of water, which renders the river useless for the *Ilala*.

The site of Mankambira's original village is some distance further up the lake, as will be seen on looking at Livingstone's map. Rather more than a year ago, he came here to escape a Mangone invasion,

and has been unable to return. From the River Lueia, north and south, there is a broad raised beach, perhaps in all 2 or 3 miles long, behind which there is a marsh. It is on this beach that the village, numbering more than 1000 huts, is built, and its naturally unprotected sides are defended by double stockades, of young trees 15 to 20 feet high, and several yards apart.

On Thursday, September 16th, we started from Mankambira's, and after marching several miles through cassava gardens, the road led through a shady wood along a hilly ridge, and then struck across the plain of the Lueia, and its equally large tributary the Limpassa. It is low-lying, flat, and broken up here and there by large holes full of water. The course of the river is marked by a grove of Suhari palms lining its banks, while here and there among these a species of date palm is also found. The Suhari palms have a peculiarly graceful curve of the frond, which springs, even in full-grown specimens, from a point a few feet above the ground. It has a beautiful yellowish-brown fruit, closely resembling a pine cone. At several places on the plain these palms abound. The midrib is much used by the natives in their house-building operations.

We crossed the Limpassa, above its junction with the Lueia, by a felled tree lying across it. At this point it is about 10 yards wide, and 18 inches deep. The natives tell us there are so many fallen trees in it, that they cannot go up it in their canoes.

Our path lay through thick bush crowning a ridge, along which we gradually ascended. Good trees were frequently found, and the road is on the whole pleasant from the shade enjoyed. The soil seemed very fair, and of reddish clay. We camped on the 20th at a place called Karuru, where there are the remains of an old Mangone village. The soil here is a good red clay, with two streams near it, but sunk somewhat in their valleys. Pleasant ridges rise all around, and abundance of good timber, both as to size and quality. A number of felled trees showed they were solid in the centre, and that most of them were not very liable to the attacks of the wood-destroying beetle. Had there been a wider extent of country and a higher elevation, it might have suited our purpose. It may yet become a station of importance. A tree bearing an edible fruit called maula, resembling a small rennet, with a sweetish taste but a large stone in the middle, grows in this district. It is found also on the hills at the north end of Lake Nyassa.

The climate in this district seems to be very humid. The last two nights our tents were drenched with dew, and our march on the morning of the 21st, soon brought us to places where heavy rain had fallen. We were now approaching the hill-tops, and as we advanced, trees began to get fewer until great bare slopes were seen without a bush. Our road appears to have led us along the ridges forming the watershed between the Limpassa and the Lueia. From the top of the mountains looking east

and north-east the Limpassa Valley lies before us, bounded on the east by the mountains along the lake shore, and on the west by the mountain range on which we stand. These gradually go towards each other, and shut in the valley on its northern side, while to the south a misty haze indicates its junction with the Lueia, and the position of the marsh behind Mankambira's. Flat, and most probably unhealthy, at its southern end, this valley in its northern half is cut up into an almost interminable number of ridges, the hollows between which are, however, far from being so deep as those at Tambala's. Looking southwards from where we were standing, the landscape is made up of a continuous series of tree-covered ridges, many with gently rounded slopes, while in the distance some large, craggy mountains are seen.

Crossing the undulating slopes on the mountain tops, we found numerous rills of clear cold water. In the afternoon (Saturday 21st) we met a Mangone scout, who directed us to the village of Chipatula's brother. Going to it we found a good stream called the Linyangwa, which we crossed, and ascending a ridge on the opposite side, pitched our camp, having the stream and plain between us and the Mangone, whom we saw collecting near the old village. Messages were interchanged across the stream and friendly relations established. As in the case of Chiwere, we found that here the original Chipatula was dead, and that in the meantime authority was vested in a headman named Mambelwa, until such time as the son of Chipatula, bearing that name, should come into power. Two brothers of Chipatula were in command of this party of about fifty men, armed with shields, spears, and clubs, and most wearing a white cotton net tied round their heads. We told them we were going on a friendly visit to Chipatula. Another march of about 10 miles brought us to the vicinity of Chipatula's village, where we pitched our camp on a ridge. The whole district, though open, is more varied than at Chikuse's, or Chiwere's; but, as in the first of these places, great granite crags reared their rugged heads here and there, while deep ravines led off the water to the River Kasitu, which rises in the district, and which flowing westward and then northward, turns eastward to flow into Lake Nyassa to the south of Florence Bay. The country may be called a land of ant-heaps, for look where you will they are to be found, and seem to be the most fertile parts of the soil, for they are almost invariably cultivated, and it is no uncommon thing for a watch-hut to be built on the top, and a fence put round at a few yards distance from the base enclosing the cultivated patch. Maize is the principal crop of the district, but the stalks only grow to a height of 3 feet, and the heads are often poor. Cattle are in pretty large numbers, each village having its half-dozen or dozen; and they told us they are much more numerous at Mambelwa's. Sheep and goats they have in abundance.

A present was sent to Chipatula the day after we arrived, and soon afterwards he paid us a visit. He is about thirty-five years of age, wearing

the tribal head-dress, and having fastened in front of it the head of a small bird with red beak, and a strip of red flannel with coloured ends round his head, and hanging down behind, while a couple of fathoms of blue cloth thrown across his shoulder completes his clothing. His countenance expresses intelligence with kindness, while care has furrowed some lines on his brow, and there is also some of the cunning common to his people. He thanked us profusely for our present, and gave us a warm welcome to his village. He told us frankly he was not at present chief of the district, but would be when the days of mourning for his father were over and the headmen agreed it would be the proper time to call him to the chieftainship. The same frankness was noticed by us in his two brothers, and there is among the people here altogether much less of the superstitious dread so noticeable among their southern neighbours. At the same time there is often a childishness in their behaviour, in place of the dignity displayed further south.

To the chief, his brothers, and headmen, we again and again related the object of our visit. Speaking about our work on the lake, we told them of our teaching children to read, and older men to work, and showed them our table sawn out of native wood and made by a black man. We showed them how we cut wood with a saw, which astonished them very much. We told them about training cattle to work, and asked them why they did not use theirs for that purpose. They did not know the way. Would they like us to teach them?

We stayed four days at this place whilst messages were sent to Mambelwa, and to Mtwaru, a chief under him. On the afternoon of the 27th we resumed our journey, which lay northwards till Mount Choma was reached. We passed on the way several small villages, with cattle grazing in the hollows near, and saw away to the north-west a great many villages dotted along the ridges. Towards these four or five parallel footpaths led, showing a good deal of traffic. There have been many small trees in this district, but most have been cut down, leaving only leafy stumps 3 feet above the ground. At the base of Mount Choma we found a lot of badly burned iron slag, and were told that there are iron pits at a hill some distance north-west. There are several other iron pits in the district, but their exact locality we have been unable to discover.

Crossing a ridge of Mount Choma, we came upon a herd of elephants, and were successful in bagging two. The men with us were delighted with the supply of meat thus afforded them, while the villagers in the vicinity gathered in great numbers to cut them up. In twenty-four hours bare bones was all that remained of the huge beasts. The district all along has a poor soil covered with a low bush.

Our road from Mount Choma lay eastward to the lake at Kuta Bay (Bandepe in Livingstone's map), along the top of a mountain ridge, having a deep descent on its south side, of perhaps 1000 feet, while on

its northern it has another hollow more broken up. A thick haze hung over the lake, and Dr. Livingstone's supposing it to end hereabout, may be the less wondered at, when within 3 miles of it we were unable to see the water, though looking directly at where it was. The descent from the hills to the small plain behind Bande,* is frightfully steep. Some of our carriers got dizzy, and were obliged to hold on by twigs, while they sat down to recover.

The people at Kuta Bay received us hospitably, and were glad to hear of our having gone as peace-makers to the Mangone, and wished to hear from us how we had been received. We told them that the Mangone expressed themselves as being desirous of peace, and that ambassadors were going along with us to carry assurances of peace to Mankambira.

On the 1st October we left Kuta Bay, and began our march southward by ascending a high hill, on the south side, by a path about as steep as the one we descended, and camped at an elevation of 3800 feet above sea-level. From this point our route lay southward along the mountains skirting the lake. On the top they are bare of trees, having gentle grassy slopes with water in the hollows. The kloofs on the hill-sides are covered with trees, and the branches of those on the west side of the hills are covered with moss, often hanging in festoons a yard long; indicating a moist climate. The soil on the hills is of a red clay, and is tolerably fertile. A good many footpaths are seen, leading in different directions.

On the 3rd we began our descent into the Limpassa Valley, and after crossing the Little Limpassa we came to some old villages, with remains of the old crops of cassava, castor-oil plants, &c., in the adjoining gardens. Further on we came to another on a rising ground called Maroyera. Looking round here we see a wide expanse of country, stretching across the whole valley, which is, however, much cut up into ridges.

We camped here to examine more carefully the surrounding district, as it seems well fitted at least for the sites of native villages. One place here, called Mudaye, presents what is probably the best place we have seen in the district, with an elevation of 800 or 900 feet above the lake. There is the great drawback, however, that a fly is reported to exist in the lower part of the plain, which if not the tsetse, resembles it by its bite killing cattle. The specimen of the fly shown to us was not the tsetse, but belongs to the blood-sucking tribe. The Mangone had at one time lived in the hollows, but removed further up the hills to save their cattle. At Karuru, where they had a large village, the dogs were said to go mad at the beginning of the rainy season.

* Bande is the name of a small hill on the shore, not an island. The "pe" at the end—Bandepe—being merely a definitive particle in the language of the district.

On Saturday, 5th October, we struck our tents, and arrived at Mankambira's in the evening. The road is on the whole easy. There are three nasty gullies which it crosses, and there are some places in the plain, which during the rains may be covered with water; but this can only be ascertained during the rainy season.

Last year in coming south in the *Ilala* Dr. Stewart got guides for Mankambira's at a small bay called Ngkata, and this we were anxious now to see, with regard to its suitability as a harbour. Mr. Stewart and I went in a canoe to examine the place. There are two small bays separated by a rocky hill just big enough to hold the native village. The beaches of both bays are almost continuous, and across from water to water, the distance of a few yards, a double stockade has been erected by the villagers. Standing on the beach the south bay has an opening seaward of only 60°; the north bay, rather more. The south one has very deep water till close inshore, but there is on its south side a small cove, with water enough for the *Ilala*, and which, were a small pier made outside, would form a little dock.

On Wednesday, October 9th, we resumed our journey southwards. In the afternoon we were delayed some time in getting across the River Lueia. Next morning we crossed part of the same valley we had already been in, but went westward to the River Lueia, which we struck below its cataracts. The scenery reminds one very much of part of the Murchison Cataracts, on a small scale, and the falls of the Lueia resemble somewhat those of Patamanga on the Shiré. The Lueia, gathered above into a still basin, is precipitated over a ledge and through a crack in the slaty rock, falling perhaps 30 feet, rushing in a troubled stream over rocks for a good distance further on. Canoes come up thus far, with men who fish at the falls for the sanjika, which at this season goes up the rivers to spawn. They use a small net on the fork of a long branch, and this they place in quiet crevices of the rocks, where the fish go to rest for a little in their struggle up stream. Crossing a hill forming one of the banks of the Lueia at this point, we found the natives drag their canoes past the cataracts. This led us to expect some fine reaches of the river higher up, but in this we were very much disappointed. With the exception of a mile or two of deep still water, the whole bed of the river is rocky, and useless for navigation even by canoes.

Our homeward route now took us among tree-clad heights, very steep and having fertile soil. The place was pointed out to us, where Arabs from Mataka's had pitched their camp, whence they sent to Chipatula's for slaves. Several small streams wind among the hills, none, however, being of great size. We passed one fertile valley, formerly inhabited by Kanyenda, but we were unable to get any high ground near it having space enough for a large station. Again we mounted ridges, keeping nearly parallel with the shore of the lake, towards the valley of the River Livu

—one of the places which favourably impressed Dr. Stewart last year. The ridges we found steep and rugged, often rocky; but the district near the valley is one of the finest we have seen in our march. Building timber is plentiful and good—indeed, in this respect, no place on the lake known to us, is on a par with it. We crossed the valley at the village of Matete, rather higher up than Dr. Stewart did last year. Of its fertility there can be no doubt. Maize we found growing luxuriantly at all stages, in damp places in the gardens, and tobacco and sugarcane in abundance. Such a place is the delight of the African. On the other hand it lies so low, that in the rainy season the water stands neck-deep in the village of Matete, obliging the inhabitants to retire until the rains are over. We inquired about the hills at the upper end of the valley, but were informed that nobody lived there, and that the hills were rocky and infertile. These points we wished to examine for ourselves, but the guides we got took us by a wrong road up the hills, leading along the coast to Mount Kowirwi. The soil of these plains consists chiefly of disintegrated mica schist from the hills above.

We had a good deal of climbing among these ridges, which are of a red clay, very much resembling the Shiré bank at Chibisa's village. Rain action has cut great gullies in the hill-side bordered by banks often 100 feet high. These ravines are slowly but surely eating their way inward. The full effect of this action was seen by us when we gained the summit of the lake mountains, and found between us and the next range a deep valley, running southwards, from which other ravines had cut their way into the hill-sides, so near to each other that the dividing ridge had only room for a footpath on its top. These ridges had all been recently covered with trees, but they had been felled to permit of cultivation. Fire had then done its work, and left the whole country a blackened district, while the trees, more gradually reduced to heaps of white ashes, shaped like their limbs, looked like skeletons, and gave an appearance of desolation to the scene we have nowhere else beheld. The climbing in this region was dreadful, and most of our men on the evening of the 14th deserted us. Two days, however, made them glad to return to their work.

On the top of Kakungonda, where our tent was pitched, we had an altitude of 4700 feet, and a higher altitude is found some distance further inland. All round as far as we could see from this place, the country is cut up by deep ravines and valleys in a most rugged fashion. The soil is fertile, and natives would live and build their dwellings here, but Europeans would avoid it. On one of the ridges where we pitched our tent on the 15th, we had difficulty in finding breadth for our tent, while on each side the descent was 200 feet, or thereabout. We were not sorry to get out of the district, proceeding along a valley leading towards Mount Kowirwi, and passing several iron furnaces, with a clay funnel 6 feet high. The iron smelted in these is said to be got at a

place three days' journey from this. As a better road, our guides led us across the shoulder of the hill on the north side of the valley. This brought us through a very nice small valley, with a good elevation, fair timber, and fertile soil. Its disadvantages are want of water, which is found only in the hollow, and difficult communication with the interior.

We descended to the shore of the lake, and kept along it till we reached our old camp at the base of Mount Kowirwi.

On the 23rd October we arrived at Kota-Kota, having marched by a road considerably further inland from the lake than that we took on the outward journey. Most of the way led across either low plains of bluish clay, or ridges of grit and quartz. The sun had been so hot at midday for some time past, we were compelled to rest several hours each day. Jumbe received us at Kota-Kota in as friendly a manner as formerly. He told us he had received a letter from Seyid Burghash, telling him to receive the English well on any occasion they might visit him.

On Monday 28th I left in the *Herga*, but a squall coming on made us haul up on the beach north of Lake Chia. On the 30th and 31st rain poured in torrents, and several of our men were down with fever. William Koyi had a slight attack, and Mr. Stewart and I were a little shaky, but kept our legs. Leaving the *Herga* at Lake Chia, we went south, along the ridge bordering the coast to the bay west of Benje Island. Water is scarce, and for miles the soil is little better than gravel. Descending to the plains and keeping south, we skirted the marsh of the bay, passing over miles of burned papyrus, where in ordinary dry seasons water stands. Of all the streams we crossed in the hills, on the outward journey, not one seems able to find its way to the lake, all being drunk up by the thirsty plain. What water we did get other than that of the lake had a sickening sweetish taste, which made it far from pleasant.

From our camp, behind Mount Tsenga, we had to march to the River Lintippe, a distance of 19 miles, before we got water. The Lintippe we found flowing in a sandy bed between deep-cut banks, with very little water in it. We struck it about 6 or 7 miles from the coast, where there is a large village among a number of tall, shady trees, and a few scattered palmyras. Keeping along the course of the River Lintippe, we came to Mpemba's village, built among the reeds at its mouth. He had formerly lived at a better place, a mile or two inland, but had been obliged to take refuge in the swamps from an attack by the Mangone.

Mpemba and his people belong to the Ajawa tribe, and have a good deal of energy, undertaking trading expeditions between the Avisia country of the interior, and Quilimane, or Kilwa, on the coast. We saw Mpemba himself. He is a tall, strongly-built man, with a determined expression of countenance, who would not be likely to scruple about committing a cruel action to accomplish his ends. Next morning the *Ilala* was seen steaming across to us, and ere midday we were all on board proceeding down the coast, and after visiting a place called

Mankamba, and the surrounding district, arrived at Livingstonia in the afternoon of November 9th.

A short note regarding the languages spoken by the tribes among whom we travelled may conclude this report. The Mangone speak the Zulu language in a varying degree of purity, those about Chiwere's being (William Koyi tells me) able to use all the clicks. At each of the three centres it is mixed with a good deal of what belongs to the language of the people immediately subject to them. This at Chikuse's is Chinyanja and Chijawa; at Chiwere's some Swahili is added, and at Chipatula's Chingkamanga. Chinyanja is understood by most of the people under Chikuse. Chijawa is the language of those under Mpenba and Tambala. At Kota-Kota, Swahili is the language spoken by Junbe and his followers, while Chinyanja, Chijawa, and Chingkamanga are spoken by the common people. The Akamanga under Mankambira speak the Chingkamanga language, but Chinyanja is understood by some one everywhere. We were happy in having a guide to Chipatula's who understood both Chinyanja and Chingkamanga. With his help we were able to make out a vocabulary of over 500 words, and to make some progress in the grammar. It closely resembles Chinyanja, but is apparently simpler in its grammatical details. Comparing it with the words of the Chungu people we got last year, they seem to be different languages. Whether the dialect of Kalonga's people may supply the connecting link remains to be seen. By degrees we hope to spell our way round the lake.

The following discussion ensued on the reading of the foregoing papers:—

The CHAIRMAN (Sir Rutherford Alcock) said Mr. Stevenson (who had communicated Dr. Laws' Report) was one of the chief supporters of the successful mission on Lake Nyassa, and chairman of the Livingstonia Mission Committee. Much doubt still existed as to the exact longitudinal direction of the Lakes Tanganyika and Nyassa, and the width and nature of the intervening land between the northern end of the one and the southern end of the other. In connection with the idea of forming a line of communication, chiefly by water, between the mouth of the Zambesi, and the Victoria Nyanza, and so to the Nile, it was naturally important, in view of the portage here required, to ascertain whether there was a wider or a narrower belt of country between Tanganyika and Nyassa. A great deal depended upon whether the northern part of Nyassa lay a little more to the east or to the west. If, as had been contended, Nyassa at its northern end approached a good deal nearer to the southern extremity of Tanganyika than was formerly supposed, the difficulty of communication between the two would be materially diminished.

Mr. STEVENSON said he had made the subject of Lake Nyassa his study, and had printed for private circulation a pamphlet with what was, he feared, the too ambitious title of 'The Civilisation of South-East Africa.' In one of the three maps contained in the pamphlet it might be noticed that he had placed the longitude of the northern end of Lake Nyassa 120 miles west of the position given it by the late Dr. Petermann in the 'Mittheilungen.' He (Mr. Stevenson) wrote at the time to the eminent German geographer, giving his reasons for differing from him, and in Petermann's review

of the pamphlet he made no objection to the alteration. He had evidently adopted Mr. E. D. Young's map without being aware that it required adjustment for the variation of the compass, which Commander Cameron had shrewdly indicated might prove to be the case. Captain Elton's local map differs from this general map, and very nearly agrees with that in his (Mr. Stevenson's) pamphlet, but it is hard to say how far Captain Elton was able to attain accuracy under the difficult circumstances in which he was placed. There is no mention of any correction for deviation of the compass north of the middle of the lake. This being understood, it would be found from a comparison of Mr. Young's map with Captain Elton's local map, that the mountain 12,000 or 14,000 feet in height indicated by Captain Elton is identical with the mountain which Mr. Young saw terminating the Livingstone Range to the north. There is therefore no new discovery of a lofty range; the great range of mountains, indicated in the general map of Nyassa accompanying Captain Elton's journal as crossing the head of the lake nearly at right angles with the Livingstone range, being the result of a mistake as to the longitude of the head of the lake. The compiler also mistook the position at which the party landed at the north end, and was thus led to think that he saw such a range when he was really looking at the Livingstone Mountains. The map inserted in the 'Proceedings' of this Society (vol. xxii. p. 231) shows this still more clearly. He (Mr. Stevenson) thought that the evidence in favour of his view as expressed in the third map of the pamphlet which he had already mentioned, was now very strong; for Cameron fixes nearly the same point for the head of the lake, from calculations based on the variation of the compass on Lake Tanganyika. If his longitude was correct, the head of Nyassa would be moved so far west that the distance between it and Tanganyika (if Livingstone's and Cameron's longitude is accepted) would only be 120 or 130 miles, instead of 250 as was formerly supposed, and consequently the London Missionary Society and the Livingstonia Mission might hope soon to shake hands across the intervening space.

The CHAIRMAN called upon Dr. Mullens to state what early prospect there might be of the Tanganyika mission party co-operating with the Nyassa establishment.

Dr. MULLENS said he was afraid that the reduced strength of the London Missionary Society's party at Ujiji, owing to the lamented death of the leader, Mr. Thomson, would prevent them from doing much; but when the last messenger left, Mr. Hore was getting his boat ready, and it was hoped that by this time he had begun to visit the shores of the Lake north and south of Ujiji, in order to make acquaintance with its people.

Mr. HUTCHINSON said that the time of the Church Missionary Society's party would be chiefly occupied in permanently developing their forces in Uganda. With regard to exploring the Kitangule River, he might mention that the mission party had already examined some of the rivers flowing into the Nyanza, which were represented by a great authority as being a mile wide, but were found after a little distance only navigable by a man with a Boyton dress and a stout pair of shoes. Therefore he thought they would prefer the Nile as a means of water communication, more especially as they had recently heard from Colonel Gordon that the party which left England in May started from Lado viâ Duffi to the lake on the 2nd November. He would take this opportunity of stating that the death of Mr. Penrose, who went out as an engine-fitter, was not, as had been rumoured, in any way due to Said bin Salim, formerly Governor of Unyanyembe. At that very time Said bin Salim was entertaining two members of the mission, Coplestone and Stokes, and there was no doubt that Penrose fell a prey to *Ruga Ruga*, or banditti, who infested a belt of forest land. If he had taken the advice of the Arabs he would not have fallen a victim. All who had listened to Dr. Stewart's

paper must have been greatly struck by the progress that was being made by the Scotch Mission, and all who were interested in the development of Africa would wish them God-speed. Twenty-five years ago that which was now known to be a chain of lakes was supposed to be one sheet of water, but the whole chain had now been taken possession of by various missionary agencies. The known geographical features of the continent seemed to discourage the idea of easy communication between Lakes Nyassa and Tanganyika. The great chain of mountains lying parallel to the coast became to the north of Mombasa an upland with high peaks; to the south this was balanced by the mass of the Livingstone Mountains continued in the Kondé Range, which ran probably across the north end of Lake Nyassa and joined the Muchinga Mountains, thus forming the south-eastern and southern boundary of the great plateau in the centre of the continent. Dr. Stewart had said that the only thing that Europeans in Central Africa need fear was fever, but in an interesting letter which had been received by the Church Missionary Society from their agent in East Africa, Mr. Mackay, attention was drawn to the fact that no death had yet occurred in Eastern Central Africa from fever: they had all been from dysentery, and the suggestion was thrown out for African travellers that the one staple of diet should be rice, without which no explorer should undertake a journey.

Dr. STEWART, in answer to a question by Admiral Sir E. Ommanney, said there was very little current in the waters of the Rombashe. It drained a flat plain, which had no rise for 20 miles. The volume was exceedingly small. Within the bar, the depth varied from 18 to 21 feet. The result of observations during two years at Livingstonia was that the rise and fall of the lake was 3 feet in the wet season, as compared with the dry season. With regard to what Mr. Hutchinson had said about fever and dysentery, he would not like to state any view that was not really correct; but, in reality, with dysentery there was always more or less fever, though not necessarily malarious fever. There were distinguished African travellers present, who, he was sure, would agree with him when he said that the chief action of malarious fever was to poison the nervous centres, to affect the digestive and assimilative power, to lessen the vitality, to destroy the power of the man, and to reduce him to utter weakness. There might be dysentery with it or not, but as Mr. Hutchinson had stated the view that was taken in the Nyanza region, he thought it right to state the view which was held in the Nyassa region. It was not expected or intended to have water communication between Nyanza, Tanganyika, and Nyassa. He would be sorry if so mistaken an impression should be left on the mind of anyone present. Even from the mouth of the Zambesi to Nyassa, it would always be necessary to have a land transport of 70 miles to get over the Murchison Cataracts.

The CHAIRMAN, in concluding the proceedings, said Dr. Stewart might rest assured that all who were engaged in the self-sacrificing and admirable work of African civilisation had the sympathy of the Geographical Society in their labours. He could not conceive a more admirable work for the devotion of a life, than that in which those gentlemen were engaged. The Paper showed how much might be done without violence or bloodshed, where there was a determination to avoid either if possible. As to the Kondé Mountains, Mr. Stevenson had certainly found an easy way of getting out of the difficulty. He had made mole-hills of mountains. The question was to be settled by ascertaining the correct longitude of the lake shores, and no doubt with such explorers as were now at work, it would be definitely settled in a very short time. The work of the last twenty-five years was really marvellous. At the commencement of that period all that was known was that there was a Nile, and that there were mountains and deserts, but no one knew anything definite about them. The progress of the last years went on in a sort of

geometrical progression, and it might be expected that every year it would increase almost at the same rate. The Geographical Society never felt more gratified than when engaged in receiving the reports, and affording every encouragement by its sympathy to those who were labouring in this noble field. He might mention before concluding, that news had lately been received from Mr. Keith Johnston and his assistant. They were preparing for their start at Zanzibar, where they were in perfect health, and making all their arrangements with great judgment. He had no doubt that within a short time information of their passage to the mainland would be received; and he trusted one of the knotty problems as to the nature and extent of the country between Nyassa and Tanganyika would be in a fair way of being solved by them. There were rumours that a very celebrated explorer was on his way to reorganise the Belgian Mission and send it forth on a fresh expedition, and the Royal Geographical Society wished them God-speed. With all these agencies at work, every year must produce an enormous increase of geographical and ethnological knowledge of the hitherto unexplored regions of Central Africa. Even by the war with the Zulus, geography would be benefited, for that country had never yet been properly explored.

Notes on the Physical Geography of Zululand and its Borders.

By the Rev. GEORGE BLENCOWE.

HAVING during a residence of nineteen years in Natal and the Transvaal, including a journey through part of Zululand to Ketchwayo's Kraal, availed myself of my many opportunities of making observations on the configuration, physical geography, climate, and geology of these regions, I have pleasure in laying the following notes on the subject before the Royal Geographical Society.

The border land of Natal and the Zulu country is rugged and mountainous, with the exception of about 10 miles to the south of the Blood River, and 4 or 5 miles from the mouth of the Tugela; in both of which places the hills recede so as to give an open and undulating grassy boundary. The Tugela—the principal boundary—rises in a marsh on the Drakensberg, from the other sides of which the Caledon and the Orange rivers take their beginning. From its entrance into Natal its course is through the rugged slopes of the Drakensberg, into a district only gradually declining, and with hills on both sides from 300 to 800 feet high, now approaching, now receding, but in no case fully closing-in until a few miles below Colenso, when it enters the gorge, from which it only emerges a few miles from the mouth. The average depth of this precipitous valley is 2000 feet. In some cases the hills rise to 2500 feet direct from the river, with not more than half a mile from the centre of the river to the crest of the hill; and in such cases they are covered with grass or scrub, or both, to the top, or to the perpendicular cliff of sandstone and trap which crowns them. The outward edge of this valley has all the irregularity which a varying width of from 3 to 12 miles would give. Within there is every variety in direction and height of ridge, and conical and precipitous hill. The whole—ridges, hills, and valleys—is

covered with various kinds of mimosa and other thorny shrubs, wild olive, euphorbia of many varieties, sundry aloes, a creeping cotton-tree—which bursts its pods in June and covers a large mimosa into which it has climbed with its seeming efflorescence—and here and there a plant of wild coffee. In only a few places can this valley be crossed; and in these we have to select the spots where the hill-walls recede, and then proceed by zigzags from one ridge to another, or take advantage of a valley running down to the river, and descend by its sides. In no case can a horseman descend in less than two hours from the lip of the valley.

The valley of the Buffalo, from Rorke's Drift, is similar in its character to that of the Tugela, except that 6 miles below the above-named point the hills recede on the Natal side, so as to present an irregular plain of from 1 to 2 miles wide not more than 100 feet above the water. As it approaches the Tugela the Buffalo is exceedingly tortuous, its course being three times the distance of a straight line, while its banks in some cases are perpendicular walls of a vitreous shale which has been thrown into perpendicular by subterraneous action, of which the surrounding country gives abundant proof. The river itself is a succession of rapids and pools, the former too frequently recurring to permit navigation, and too swift for crossing when much water is in the river. This description applies also to the Tugela, where it forms the frontier, except within 3 miles of the sea, when it flows over a deep bed of sand, through which it cuts for itself new channels every flood.

The heat in both these valleys is very great, and in seasons when the rain is almost confined to thunderstorms scarcely any falls in them, as they are out of the range of storms, which skirt their edges or run in other lines. One season in four the rain comes too late for the "mealie" (maize) crop, but when sufficient and early the crops are abundant; so that from the fertility, the abundance of fuel, and the high temperature, it is a favourite place of residence to the natives. The only parts capable of cultivation are small plains formed by the deposit of soil washed from the surrounding hills on to beds of friable shale, which are in many places found towards the base of the sandstone, that forms the substance of the hills through which the Tugela runs. In other parts the surface is covered with fragments of trap, which have been dislocated and scattered by aqueous action, which apparently has been also the means of excavation. An evidence of this aqueous action we have in the alternation of tongue and cliff in all the curves of these rivers. On the convex side of these curves the water runs close to the foot of the hill, from which in some cases it has cut a perpendicular wall 300 feet in height; while on the concave side the ground slopes gradually away from the river. The current, turned at an angle equal to its angle of incidence, rushes to the other side, where the same results follow.

The boundary between the Transvaal and Zululand differs entirely

from the one already described. The Blood River runs through an open undulating country, from its source down to its junction with the Buffalo, and its course from the source to the Pongola lies through the spurs of the Drakensberg to the north-east of Utrecht. These hills are heaped in all conceivable relative positions, and vary in height from 500 to 800 feet. They have in many places protruding angular blocks of trap, and occasionally a cliff at the top, not often more than 50 feet high. In other parts they have a good depth of soil and produce abundance of grass. The Pongola Valley, which at its head is not less than 2000 feet deep, is free from surface stones, while its trees are clustered on and around the shoulders of the highest hills. Unlike the useless scrub of the Tugela Valley, there is valuable timber of yellow-wood, stink-wood, red and white pear, boken-wood, and some others. The Pongola does not run more than 15 miles in its cradle of hills. First, its southern side is set free, and then through open undulations it makes its way to the Lobombo Mountains, through which it descends to the sea by Delagoa Bay. The valleys of the Pongola and its tributaries are well watered from abundant rains and strong fountains. Their sides are steep, and in some cases they run a long distance through the winding hills, so that the streams, which are always found in their bottoms, rapidly fill and pour onward with overwhelming force. This is the reason why the troops recently overpowered at the small river Intombi were unable to cross for three days, during which the rain lasted, and why the twenty who are supposed to have attempted to cross were washed away.

From the point where the Pongola leaves the hills, the Zulu country to the south and east is open, with only a few isolated and inconsiderable hills rising at intervals till the Lobombo Range is met, which runs from Delagoa Bay to the royal valley of Mahlabatini, from which it breaks off in several lower radiations. This northern part of Zululand is without trees, but has abundance of good grass. In the Mahlabatini Valley euphorbiæ of large size, mimosa, and other littoral and semi-tropical trees and shrubs abound. This valley is about 20 miles by 8, with a direction of about 20° to the south of east and the north of west, and must be 1500 feet below the bluff of the Lobombo at its upper end. From Mahlabatini southwards there is a succession of rounded hills not more than 2000 feet above the sea, and from 200 to 500 from their own base. Some of these are stony on the surface, but generally are well covered with soil, and here and there small clumps of bush are found. In going from the royal valley to the lower drift of the Tugela, from 25 to 10 miles distant from the Tugela we pass through belts of shaly country, with a thin soil on which a thorny scrub grows sparsely. From a few miles to the north of Etshowi (Ekowe) a plain of luxuriant grass stretches eastward to the sea, which through its entire extent is unencumbered by bush; and so far as a judgment without trial can be formed, is supposed to be especially adapted for the growth of sugar-cane.

Entering Zululand from Natal about 20 miles from the mouth of the Tugela, after the ridge has been scaled, there is a series of steep-sided hills well covered with grass, but without trees, which intertwine in a maze-like manner, and have badly drained valleys. Some of the valleys form shallow lakes grown up with reeds, and the remainder have such soft and spongy banks to the streams which slowly creep through them, that crossing them is very difficult. This part of the country has not been occupied for the past twenty-five years; before that time it sustained a large population, as the remains of kraals and gardens still show. After crossing a belt of such country of about 5 miles' breadth, the valleys widen, and from three-quarters to a mile and a half spread out to five and six miles from ridge to ridge. None of these, wide or narrow, are more than 300 feet deep till the Umhlatoosi is reached, whose valley is at least 1000 feet deep, and entirely destitute of trees.

The seasons in this part of Africa are two—summer and winter. In the northern part of Zululand, to the west of the Lobombo Range, summer begins with the first rains, which fall from the beginning of September to the middle of October. In a few days after the rain the country is covered with fresh grass, and all animal life is quickened. The winter in this part commences with the first frost, which usually occurs by the middle of May. Frost is not so severe in any part of Zululand as in those parts of Natal which border on the Drakensberg. The valley of the Pongola is much milder than that of the Wakerstroom, which is only on the other side of the mountain. Through all the higher spurs of the Drakensberg rain is abundant during the summer. And as the hills to the north of the Pongola are 7000 feet above the sea, this district has more than the ordinary rainfall, while the thick mists which gather on the tops of the hills preserve moisture even in the winter, when rain very seldom falls. Half the rain of Zululand falls in thunderstorms, and the direction of these is uniformly from west to east, but slightly deflected from this line where ranges of hills somewhat out of this direction present a suitable path on their summits. On the open country circular storms occasionally occur, which are accompanied by hail and fierce wind. One occurred in Natal, near the Zulu border, about twelve years since, which had a radius of 3 miles, and a breadth of vortex of not more than 200 yards, but through that breadth it threw down everything. In the mountains the storms are very severe: the discharges of electricity are almost incessant, and frequently several fall in broad perpendicular bands, whose continuity is not broken, and whose complexity is learned by the length of time they are visible, and by the tremulous condition of their edges. In the lower districts of the coast frosts are not frequent, and the temperature is higher and more equable, while the storms are much less severe.

The climate of the north-western part of Zululand is salubrious, and in no way injurious to the health of man or beast. The only disease

against which care needs to be taken is the peculiar inflammation of the lungs in horses, which is known as horse-sickness. But this is avoided by keeping them in the stable till the dew is off the grass. Lung-sickness has ravaged the Zulu herds as well as those of the neighbouring colonies, but it is rather an epidemic of occasional occurrence than a permanent disease of the country. For many years it has only existed in the Zulu country as the effect of contagion. The coast districts, from the higher general temperature, and the greater abundance of moisture, are not so favourable to robust health as the higher inland parts. The only part which is really unhealthy is that around and to the north of St. Lucia Bay, but this has no permanent inhabitants, and has only been used by Europeans as a hunting-ground for buffaloes during three months in the middle of winter. If a European goes or remains there beyond this time it is generally with fatal results.

The only grain grown by the Zulus is maize and a species of millet, and these are not cultivated to a sufficient extent to supply them except in especially good seasons, so that for two months before harvest they are commonly in a state of semi-starvation, living on roots of grass from the streams, and other equally unsatisfying food. The causes of this insufficient supply are the employment of the men at the military kraals, which not only leaves all the cultivation to the women, but devolves on them the labour of conveying as well as producing the commissariat supplies; and the insecurity of all property, which, under the present arbitrary rule, is constantly liable to authorised pillage.

GEOGRAPHICAL NOTES.

The Rev. Dr. Mullens left England on the 24th of April for Zanzibar. His errand is mainly to reorganise the Tanganyika mission of the London Missionary Society (of which body he is foreign secretary), but it is his intention on reaching Ujiji, should his duties require his presence there, to continue his journey to the southern end of the lake, and thence explore the country intervening between Tanganyika and Nyassa. In this isthmus, the width and nature of which are not yet known, now centres the interest of those friends of Africa who aim at establishing a system of communication, chiefly by water, through the centre of the continent. Dr. Mullens' zeal for geography and his ability as a practical explorer were shown by his admirable surveys in Central Madagascar, and the stimulus he imparted to succeeding members of the mission under his guidance, resulting in the fine new map of the island, which he has recently published. The Society has furnished him with a portion of the instrumental outfit required for purposes of survey.

Mr. Keith Johnston.—Letters reporting the progress of his preparations have been received from Mr. Johnston, dated the 4th and the 24th of February. In his last he informs us that he is about to utilise the few weeks that remain before the proper season arrives—April—for the commencement of his journey towards Nyassa, by a visit to the Usambara Mountains. He and Mr. Thomson take with them on this preliminary trip only Chuma and six porters. One of the objects of this journey is to fix the position of Fuga, on which the correct delineation of all our cartographical material of this interesting region depends.—Mr. Johnston had gleaned some interesting particulars regarding the line of route he is about shortly to follow between Dar-es-Salaam and Lake Nyassa. He says:—"The most valuable information I have yet received has been from an Arab merchant named Bushire bin Selim, who has repeatedly been to Urori and Ubená. He confirms the information previously obtained that there is no existing trade route inland from Dar-es-Salaam in the direction of Nyassa, though the countries about the head of the lake are regularly visited by means of branch routes southward from the main highway between Bagamoyo and Ujiji. The most powerful tribe through which we shall have to pass (Selim says) is that of the Wahehe, who occupy the country between Uzaramo and Ubená. The Hehe language appears to be distinct from that of the surrounding tribes, and so different that it is not understood at all by any of the coast people. Chuma, who has some knowledge of most of the languages spoken between this and Nyassa, says it is quite unintelligible to him, and it is remarkable that no Wahehe slaves have ever been brought to Zanzibar. Selim recommends that a Mhehe interpreter should be taken by the Expedition; but there appears to be some difficulty in this, as there are no Hehe people to be found in Zanzibar at present. Chuma, however, is on the look out for one. Bushire bin Selim has also given us valuable information about the sorts of beads that are at present in fashion in this region. The Wagwangwaras, of whom I spoke in my last letter, live altogether south of the Lufiji, according to this informant, and so are not likely to be met with."

Expedition to the Congo.—The Rev. T. J. Comber, of the Baptist Missions, whose paper on the Cameroons and Congo in our last number leads us to expect valuable geographical results from his further journeys in West Africa, left England for the Congo on the 26th of April. Ascending the river as far as the foot of the Yellala Falls, he will proceed by land over his old track to Makuta, and thence strike for "Stanley Pool," above the falls. He hopes to win the confidence of the timid Makuta chief and his people, and thus secure their assistance in his further journey. A small steamer, in sections, will follow by the same route and be launched on the quiet waters of the Middle Congo, should this preparatory mission be successful. Our Society has supplied Mr. Comber with the following instruments:—Six-inch sextant, artificial horizon,

hypsonometrical apparatus, and two boiling-point thermometers, two pocket aneroids, prismatic compass and tripod stand, thermometer and traveller's watch.

Portuguese African Expedition.—According to news which has lately reached Lisbon, the northern division of the Government African Expedition, under Senhores Capello and Ivens, has been heard of at Cassange, at which place the party arrived in December 1878. They separated from Major Serpa Pinto at Bihé, in November 1877, and, taking a northerly route, have since explored part of the River Quango. They had suffered much, like all recent travellers in this part of Africa, from the want of carriers, and had finally to abandon a great part of their baggage, including their beds.

The Dutch Arctic Expedition of 1879.—We learn from our correspondent, Mr. P. Bicker-Caarten, that it has been decided to send the little exploring vessel the *Willem Barents* on another trip to the Arctic Seas this summer. The Council of the Geographical Society of the Netherlands, who direct the enterprise, would have greatly preferred to follow up the successful trial trip of last summer by despatching a steamer and extending the discoveries in the Barents Sea, and on the coasts of Novaya Zemlya, as far as the Kara Sea, and if possible even as far as Franz-Josef Land, but it was found impossible to obtain the funds and fit out a suitable steamer in time for the summer. Meantime, as the *Willem Barents*, in spite of its small size, had so admirably done its work last year, it was considered to be almost a sacrilege to sell her to increase the funds of an undertaking which as yet is in embryo. It has therefore been decided to utilise the little craft for another summer's work. She will not sail till the beginning of June, nor is it intended that she shall go to Jan Mayen or Spitzbergen. The scientific staff will resume the sounding and dredging operations of last summer, and try to reach Barents Icehaven, and build a suitable monument on the spot of the famous winter quarters of Barents. If time and circumstances permit, they will navigate the Kara Sea. The intention at present is to delay the return a month later than last year. Such is the general plan so far agreed upon; the details may be more or less modified at subsequent meetings of the Council. Meantime the *Willem Barents* will be repaired and refitted with a view to security, and the greater comfort of the crew, which is already nearly all chosen. Regret has been expressed that Lieutenant Koolemans Beynen, who served as lieutenant last year, is no longer available, this officer having been recently commissioned to the Indian Archipelago. Dr. Sluyter, the zoologist, being now in Java, and Dr. Hymans van Anrouy, the surgeon, also will be missing, so that Captain A. de Bruyne, and the Jonkheer H. M. Speelman are the only two members of last year's Expedition who will again serve—the former will

be the commander, and M. Speelman will attend to the magnetical observations. Mr. W. G. A. Grant, who made last year so valuable a collection of photographs, will again accompany the party, to the great satisfaction of all concerned, he having made himself a general favourite with all on board. Lieutenant Koolemans Beynen will be replaced by two officers, Mr. Broekhuijzen, Lieutenant 1st Class, and Mr. Kalmeyer, Lieutenant 2nd Class. Mr. Lith. de Jeude, student at Utrecht, will succeed Dr. van Anrony, as zoologist. The vacancy in the medical department has not yet been filled up. The crew will number nine men, instead of eight as last year. Although one of the objects of the Expedition is to make it serve as a training school for sailors, the vessel is too small to carry more.

The Relief of Nordenskiöld.—The last act of our retiring President, Lord Dufferin, was to address, on behalf of the Council, a letter to the Admiralty, suggesting that a vessel should be despatched in the spring to Port Clarence in Behring Strait, or some other safe harbour, in order to watch for Nordenskiöld's party, and be prepared to render any aid that might be required. It appears from information obtained by the Admiralty in answer to inquiries set on foot in consequence of our letter, that the Swedish Government do not feel much apprehension with respect to the Expedition, the *Vega* having been repaired and strengthened in the Government dockyard before starting, and fully equipped for spending at least one winter in the ice. Our Minister at Stockholm was also informed that the Russian Government had promised to despatch one of its vessels belonging to the Pacific Station to Behring Strait, to endeavour to communicate with Professor Nordenskiöld. At present, therefore, the Admiralty do not see that it is necessary for them to take any action in the matter.—In connection with M. Sibiriakof's private Expedition for the relief of the Swedish Expedition and the navigation of the Arctic Sea from Behring Strait to Europe, we learn that it is the intention of this munificent patron of geographical enterprise to send in the summer the little steamer *Lena* from Irkutsk down the Lena to its mouth, to meet the exploring vessel.

Danish Explorations in Greenland.—Lieutenant Jensen, of the Danish navy, whose adventurous and plucky attempt last summer to cross the inland ice of Greenland attracted much attention at the time, left Denmark for Greenland last month on another surveying expedition, accompanied by Lieutenant Hammer, also of the Danish navy. Lieutenant Jensen will return to Europe in the autumn, but Lieutenant Hammer is directed to remain at Jacobshavn for the winter, in order to investigate the remarkable ice-fiord near that place. Dr. Steenstrup, who left Copenhagen in 1878 on a scientific expedition in Greenland, remained at Umanak the whole of last winter, and is expected home in the autumn of this year.

New Route from the Caspian to Kungrad.—The 'Moscow Gazette' of the 16th of March publishes the following letter from a correspondent, Alexander Morakim, in reference to a newly discovered route from the Caspian to Kungrad :—"I venture to call your attention to the discovery of a new route to the Sea of Aral which is far more convenient and cheaper than the route contemplated from Krasnovodsk Bay, along the old bed of the Oxus, or the one already existing through Orenburg and Kazalinsk. The new route was traversed last autumn by the caravans of the brothers Vanuslim, merchants of Ural, who have distinguished themselves by their enterprise in the steppes contiguous with Central Asia. The route commences from the Bay of Mertvi Kultuk, on the Caspian Sea, 400 versts distant from Kungrad. The means of transport at present employed by the merchants Vanuslim are extremely simple. A camel harnessed to a four-wheeled waggon is made to carry a load of 30 poods, whereas only 16 poods were transportable with the employment of pack camels. The road traversed by these caravans was level and the ground hard; very little sand was encountered; hills and streams of a nature to obstruct the progress of these caravans were not met with. As many as twenty wells with fresh water were found along the extent of the route. The wells contained a supply of water sufficient for 200 camels. The caravans found no scarcity in these latter, as any number could always be hired for a small amount from the Kirghiz camping in the neighbourhood. This new communication with the Sea of Aral undoubtedly possesses a brilliant future, as with the exception of 400 versts from Mertvi Kultuk to Kungrad, it is effected principally by water. By the Oxus it leads to Khiva and Bokhara, and by the Caspian and the Volga to the centre of Russia. According to MM. Vanuslim, the distance by this route is shorter by one-half than by that of Orenburg. . . . Much of course will have to be done in perfecting this newly discovered route. For a regular and quick communication with the Sea of Aral and the Oxus a line of steamers would be necessary, with the establishment of which the transport of goods to Kungrad would be exceedingly cheap. MM. Vanuslim brought to Moscow by way of this new route consignments of caviare and fish from a fishing-station they have established on the Sea of Aral."

Recent Explorations in Persia.—Colonel Ross, the British Resident in the Persian Gulf, has recently reproduced a rough sketch of a map of Southern Persia, obtained by him from Haji Mirza Seyyid Hassan, physician to the Governor of Behbahan, who has been travelling in Fars for the last twelve years and has a slight knowledge of surveying. One geographical identification determined by the Haji is full of interest. The Kara-Aghach (= black wood) River, which rises to the north-west of Shiraz, was hitherto supposed to discharge its waters into the sea at Bardistan, and a note recording that belief will be found appended to the stream as shown in Major St. John's map of Persia. Major St. John

did not venture to indicate its course further than a point about 35 miles from the sea. At the same time its true direction and fate were a matter of interest, as there is no doubt it is identical with the Sitakos River, of Nearchus, the admiral of the fleet which Alexander sent from the Indus to the Euphrates; while it is also mentioned by Onesicratus, the pilot, these two authorities being quoted respectively by Arrian and Pliny. From the Haji's map it now appears that the Kara-Aghach is simply the upper course of the Mun River, which debouches into the gulf about 60 miles south-east of Bushire.—We learn also from Colonel Ross that Señor Rivadeneyra is now at Madrid preparing an account of his travels in Persia. In 1874–75 this gentleman traversed Western Persia, going from Tehran through Luristan and Khuzistan to Mohammerah, and thence past Bushire, to Shiraz, Kerman, and Yezd.—Mr. Floyer, of the Persian Gulf Telegraph Department, who lately penetrated from Jashk through the unexplored district of Bashakird northward to Karman, is said to be engaged on a work descriptive of his journey.—Colonel MacGregor's recent book on Khorassan, published by Messrs. Allen and Co., is a most excellent contribution to geography, and much new and important information is derivable from it regarding the route from Yezd to Herat, and the topography and boundaries of north-eastern Khorassan.—We hear, too, that Major St. John, at Candahar, is busily engaged in making rescarches in Persian geography.—As regards archaeology, Dr. Andreas and Dr. Stolze are engaged in searching for Pahlavi inscriptions in Fars, under the patronage of the Royal Academy of Sciences of Berlin, while comparative geography is being elucidated by the labour of Professor Hoffmann, of Kiel, who is preparing a work in which he is tracing the geography of Mesopotamia, as expounded by the Arab geographers of the middle ages.—Among new maps we may mention one recently published by Dr. Haussknecht, and another compiled by Dr. Kiepert, from the routes of General Schindler, of the Persian army, who is active in the accumulation of Persian geographical data.—From the above it will be seen that our geographical knowledge of the country has recently been almost as extensively added to as that of Afghanistan.

Overflowing of the Ab-istada Lake.—The intelligence has been received that the Ab-istada Lake, on the plateau of Afghanistan, has during the past season overflowed its banks into the northern branch of the Arghasan River. This lake has been hitherto commonly regarded as having no outlet, and as constituting a smaller, but nevertheless independent basin in the hydrographical system of Afghanistan. The Afghans stated that it had been known to overflow at the southern extremity, but Lieutenant Broadfoot discredited the possibility of this. On the other hand, Dr. R. H. Kennedy, who accompanied the Bombay column, which journeyed from Ghazni to Quetta, states that he crossed “a plain fully five miles in breadth, seamed through everywhere with deep furrowed channels and pebbly beds, indicating the outlet of the

overflowing of the lake in rainy seasons." The Ab-istada Lake proves thus to belong in reality to the Helmund Basin, which with the western portion of the Indus Basin, goes to make up the whole of Afghanistan south of the Hindu Kush and Paropamisus.

The Tal-Chotiali Route between India and Candahar.—This route has been partially explored from the side of India by an expeditionary force under Colonel Prendergast, which left Dehra Ghazi Khan on the 24th of last month, and which, having entered the hills by the Chachar Pass, according to last advices had reached Fazalkot just beyond the Vatakri Plain. No difficulties have been met with *en route* but such as could be remedied by a few days' work on the part of the sappers. The Sham, Bhor, and Name Su plains, all of which were traversed, are said to be capable of being cultivated with excellent results, the soil being good and water easily obtainable. Much of the country has, however, been abandoned and depopulated through the internecine feuds between the Beluchis. The Vatakri Plain is 4000 feet above sea-level, the soil is rich and prolific, there is a perennial stream of excellent water; the scenery is wild, bold, and grand, while the fishing and shooting are capital. Altogether the place is said to be admirably suited for a cantonment, which would thus command the passes and entrance to the Mari country. The military authorities consider that this route, which a hundred years ago was the imperial road between Candahar and India, will prove to be the most direct. While Colonel Prendergast is exploring from the east, General Biddulph is returning by the same route from the western side. He left Candahar at the head of a small force on the 8th March, marched to Khushdil, and then struck eastward for Tal, up to which point he will be traversing new ground.

Recent Exploration in Central Australia.—On January 31st, 1878, Mr. H. Vere Barclay, in command of a small expedition, called the "North-East Exploring Party," commenced a series of explorations between Alice Springs, on the Overland Telegraph Line (about E. long. 133° 53', S. lat. 23° 40'), and the eastern boundary of South Australia (E. long. 138°),—a tract of country which was previously quite unknown. The party started on the main journey on March 11th. Crossing Strangways Ranges, they pursued a course generally along, or a little to the north of, S. lat. 23°. At about long. 134° 30' they found an open plain, well grassed, with patches of salt and cotton bush. The next day (March 29th) they crossed a large, heavily timbered creek, without water in it, and came to a dense "myall scrub," impassable for the waggon; followed by an extensive plain, covered with splendid grass and native clover. To the N.N.W. the country was flat, and as far as the eye could reach to the eastward were low table-topped hills and table-lands, while high rough ranges were visible to the south during the whole day's march. At long. 135° the party were delayed

in camp for some days by illness. Shortly after leaving this camp, they observed lofty ranges to the south, and to the north high flat-topped hills running parallel to their course, the country between being an extensive open plain, nearly level, with a light sandy soil, well grassed, but dry from want of rain. Numerous watercourses were now crossed, all taking a northerly direction, none of which had been running lately. The nature of the country at this point will be best indicated by Mr. Barclay's entry in his journal on April 18th:—"We had nearly $1\frac{1}{4}$ inch of rain here, but I fear it has not extended far. The soil is just like a sponge, and to-day we have difficulty in obtaining sufficient water for our horses where yesterday was a running stream." About midday between the 135th and 136th meridians, the party struck a large creek, which Mr. Barclay named the Plenty; its bed was a quarter of a mile wide, with deep white sand, and heavily timbered with white gum trees. He states that it had not run in 1878, but must carry an immense body of water in some seasons, as he noticed flood-marks 14 feet high on the trees. Water was readily obtained by digging in the sand, and it was believed that it could have been got for twelve months without rain falling. Continuing their course along the Plenty for nearly 23 miles, the party struck a large creek joining it and coming in from N.N.W. This creek was of a totally different character from the Plenty, being shallow, with coarse sand and no water. The country about the junction of the two creeks is well grassed, with here and there small patches of spinifex and red sand. Mr. Barclay did not attempt to follow the Plenty beyond about E. long. 136° , S. lat. 23° , as it made too much southing, but retraced his steps for some distance, and on May 6th started in a N.N.E. direction. Passing over some fine country, he struck a large creek, with deep white sand, which had some water in it and had been running recently. There was fine white gum timber all along the creek and splendid feed (grasses) on both banks; a high range was visible to the northward. Continuing along the creek in an easterly direction, the party on May 9th met with the first natives seen for some time, though their tracks had been observed. The country was now much harder, with red sandstone ridges and small patches of spinifex; there were quantities of tea-tree in the bed and along the edges of the creek. At about E. long. $136^{\circ} 30'$ Mr. Barclay formed his most easterly camp, but two of his subordinates made their way in search of water, &c., almost up to the boundary of Queensland. At this camp a good water-hole was found, in which were numbers of small crabs, similar to sea-crabs. Starting in a northerly direction from this point, Mr. Barclay crossed over splendid country towards some high ranges, and he notes that the soil was deep, coffee-coloured loam, all well grassed and lightly timbered with large myall-trees, and, in places, a few box-trees; here and there were small ironstone hills and gravelly patches, and to the west and north high ranges, which he named the Jervois Ranges, in

honour of the Queen's representative in the colony. On May 28th the most northerly point was reached (about S. lat. $21^{\circ} 50'$), and from the top of a hill the country for 20 miles further appeared to be all sand ridges and spinifex, with a low range to the north-west. Being unable to find water here, Mr. Barclay returned to his camp on the creek above-mentioned (which he named the Marshall), and on June 4th, as his provisions were running short, he started on his return to Alice Springs to refit, before attempting the survey of the Herbert River.

Obituary.

Sir Walter Calverley Trevelyan, Bart.—It is with great regret we have to record the death of this eminent patron of science in various branches, one of our oldest and most devoted members, and for many years a Trustee of the Society, which took place very suddenly on the 23rd of March, at Wallington, his seat in Northumberland. Sir Walter succeeded his father as sixth baronet on the 23rd of May, 1846, and, at the time of his death, he was within a few days of completing his eighty-second year. He possessed extensive landed estates in Northumberland, Somersetshire, Devonshire, and Cornwall, and during the thirty-three years he was in possession, had very extensive improvements carried out, and thus permanently increased the value of his property. He made the farmhouses and cottages on his estates models of what such dwellings should be. Throughout his life, Sir Walter Trevelyan was a great lover of science and literature. His tastes in this direction were displayed at an early period, for when a schoolboy at Harrow he began the formation of a library, and was in the habit of rising very early during the summer months, and going long distances in search of plants. The late Mr. Fox Talbot (the chief discoverer of photography) was one of Sir Walter's schoolfellows at Harrow, and he was wont with him (who had, in many respects, similar literary and scientific tastes) to share the botanical collections which he made. On leaving Harrow, Sir Walter proceeded to University College, Oxford, and while an undergraduate he attended the lectures of the botanical and geological Professors. In his day, very little science was systematically taught either at Harrow or at Oxford, and he felt this so much that he never ceased, during his long life, to urge most strongly the systematic teaching of science in all our great public schools and at our Universities, fully concurring in the recommendations, on this subject, of the Duke of Devonshire's Commission on Scientific Instruction and the Advancement of Science.

After taking his B.A. degree (in 1820), Sir Walter Trevelyan proceeded to Edinburgh to pursue further his scientific studies, and being a very diligent student, and a very close, and, at the same time, a very careful and accurate observer, he became an excellent botanist and a sound geologist. He was besides an accomplished antiquary. He became M.A. in 1822. It would occupy much space to enumerate here the papers he published on botanical, geological, bibliographical, and antiquarian subjects; but none except those who had the privilege of knowing him could appreciate the varied range and depth of his knowledge. He was ever ready to impart his knowledge to others, and was a frequent contributor to the 'Transactions' of several of our learned societies, and to the pages of many scientific and other periodicals.

In 1821 he visited the Faroe Islands, and resided there for some time, making observations on their vegetation and temperature. Seventeen out of the twenty-two islands were inhabited at the time of Sir Walter Trevelyan's visit. His observations on the group were first published in 1835, in Jameson's 'Edinburgh

New Philosophical Journal' (vol. xviii.), and afterwards printed, in quarto form, at Florence (in 1837) for private distribution. Very important botanical and mineralogical collections were made, the former of which have been presented to the Herbarium at Kew, while from the latter selections were given to various museums, though the most important part still remains in the very valuable and interesting museum at Wallington, certain portions of which Sir Walter has, by his will, bequeathed to various national and other institutions. The unique collection of books and pamphlets which he had collected on the Faroe Islands he has bequeathed to the library of our Society.

His taste for minute and exact topographical, antiquarian, and historical research was testified by the important literary and pecuniary aid he rendered to the late Rev. John Hodgson, in the preparation of his elaborate 'History of Northumberland,' and to the authors of many other works. Two years ago he placed at the service of the Council of our Society a sum of money to be given as honorarium to the author or authors of complete County Geographies on an improved plan; an offer which the Council had referred to Professor Huxley, and which was under consideration at the time of Sir Walter's death. Of the three interesting volumes of 'Trevelyan Papers,' published by the Camden Society, the last was edited by Sir Walter, in conjunction with his cousin Sir Charles Trevelyan. He kept up for a long period an extensive correspondence with many of the literary and scientific men of the time at home and abroad. Between 1835 and 1846 he travelled much in the south of Europe, and made observations on the tides of the Mediterranean.

To the British Museum, the Museum of Practical Geology, the South Kensington Museum, the National Portrait Gallery, the Museums at Kew, Edinburgh, and Newcastle-upon-Tyne; to the Society of Antiquaries of London, that of Scotland, and that of Newcastle-on-Tyne; and to many other societies and institutions, Sir Walter Trevelyan was a munificent benefactor. He contributed, also, liberally towards the cost of the new Museum of the University of Oxford, and took the most lively interest in its improvement and advancement. Very many owe their advancement in life to his kind encouragement and timely aid, and he was the persistent promoter of all good movements, especially those for the general spread of education, and the permanent improvement of the great masses of the population.

Sir Walter was one of the original members of our Society, his election dating from 1830. He served several years as member of Council, having been first elected in 1843. In 1854 he was chosen Honorary Secretary, and in 1857 one of the Vice-Presidents. He was appointed Trustee in 1860. Besides his collection of books above mentioned on the Faroe Islands, he has bequeathed to the Society the sum of 500*l.*, and the liberty to select from his extensive library all topographical and geographical books and maps which are not otherwise bequeathed, or not already in the Society's library.

CORRESPONDENCE.

The "Idols of Bamian."

3, PEN-Y-WERN ROAD, EARL'S COURT, S.W.,
April 2nd, 1879.

I HAVE been reading with much interest General Kaye's notes on the Passes about Bamian, in the April number of the 'R. G. Proceedings.' Let me recall attention to the passage at p. 249, describing "a nearly insulated rock, on the flat summit of which there is in relief a recumbent figure bearing a rude resemblance to a huge lizard," which figure the people now call *Azhdahā*, or the Dragon, slain by a Mahomedan saint or prophet.

Now let us go back 1200 years, and take up the narrative of the Chinese pilgrim Hwen Thsang, who entered India by Bāmíán in A.D. 630. :

"12 or 13 li (say 2 or 3 miles) east of the city (of Bāmíán) there is to be seen in a convent the recumbent figure of the Buddha in the act of entering Nirvana (i. e. dying); the figure is about 1000 feet long."

For years I have been looking out for the rediscovery of this figure. And when my friend W. Simpson, starting to join the force of Sir S. Browne as artist and archaeologist, asked me for any suggestions as to points for inquiry in Northern Afghanistan, among other things I begged him, if he had a chance, to look out at Bāmíán for the Nirvana Buddha of Hwen Thsang.

But now we learn for the first time that it was seen forty years ago by General Kaye and his comrades! Better late than never. It is true the General does not say anything of dimensions, and in any case I dare say Hwen Thsang's are exaggerated. Nor can we identify position very accurately. But Hwen Thsang describes the great standing image as "on the flank of a mountain north-east of the city," and the recumbent image as "east of the city," therefore further south than the standing image. And this corresponds generally with General Kaye's indications.

Before concluding, let me venture a doubt whether the name *Bajjah* (p. 252) has anything to do with "eagles." It is a name that often recurs when one is studying itineraries in those regions, an occupation in which I have formerly spent a good deal of time. And I believe it means simply "place of toll," and marks where *bāj* or duty has been at one time or other exacted.

H. YULE.

The Khaibar Pass.

19, UPPER GROSVENOR STREET, 24th April, 1879.

SIR,—I shall be glad if you can insert the following remarks with reference to Mr. Markham's paper on the Afghan Passes, which have been communicated to me by a correspondent on the spot.

In the first place, the words used by Mr. Markham in reference to the "easy gradient along torrent beds practicable for carts" from the entrance of the Khyber Pass to Daka, are liable to convey the erroneous impression that there was a practicable road at the time when our troops advanced to Jalalabad. This was not so—there was then no cart-road. Working parties of 800 to 1200 strong have been since constructing a road.

Secondly, although the entrance to the defile route was at Kadam at the time when the travellers quoted by Mr. Markham traversed it, this is not the case now. The route now used is some distance from Kadam, and is by a road called after Mackeson, who constructed it in 1840–1.

I have, &c.,
 J. A. GRANT.

REPORT OF THE EVENING MEETINGS, SESSION 1878-79.

Eighth Meeting, 10th March, 1879. — Sir RUTHERFORD ALCOCK, K.C.B.,
Vice-President, in the Chair.

PRESENTATION.—*Robert Berridge, Esq.*

ELECTIONS.—*Allan W. Burman, Esq.*; *Major Reynold Alleyne Clement*; *Wm. Douglas, Esq., M.D.*; *Fredk. Francis, Esq.*; *J. Forbes-Mitchell, Esq.*; *Thos. Parnell Greene, Esq.*; *Lieutenant Hastings Rowley Lees, R.N.*; *Alfred Walter Lucas, Esq.*; *H. Parkes McClatchie, Esq.*; *The Earl of Northbrook, G.C.S.I.*; *The Marquis of Stafford*; *Fredk. Edward Walter, Esq.*

The following papers were then read:—

The Second Circumnavigation of Lake Nyassa. By Dr. James Stewart (*ante* p. 289).

Report of a Journey along part of the western side of Lake Nyassa. By the Rev. Dr. Laws (*ante* p. 305).

The first was read by Dr. Stewart himself. Of the second, extracts only were read by Mr. James Stevenson.

Ninth Meeting, 24th March, 1879.—FRANCIS GALTON, Esq., F.R.S., in the Chair.

PRESENTATIONS.—*J. Cuulwell, Esq.*; *John L'Aker, Esq.*; *George Seaton, Esq.*

ELECTIONS.—*Rev. T. J. Comber*; *Captain A. C. Moloney*; *George Palmer, Esq.*; *Frederick E. Pirkis, Esq.*; *Lieut. Charles Golding Prater, R.N.*; *John Smith, Esq.*

THE CHAIRMAN said it would be an appropriate preface to the lecture on Scientific Geography to which they were about to listen, for him to mention that the Council of the Society had recently addressed a memorial to the proper authorities, urging the establishment of professorial chairs of geography at the Universities of Oxford and Cambridge. The time was opportune for doing this, because by Act of Parliament at the beginning of this year the duty of readjusting the studies and emoluments of the Universities was assigned to two Royal Commissions, with full powers to act, and they were at this moment in the midst of their labours. It was indeed high time that the art of teaching geography should be advanced. It already entered largely into the modern course of studies at the Universities, and whatever was taught there ought to be taught well. University professors were required to develop and systematise the art of teaching, to collect maps and other educational appliances, and to show by their example how a sound and liberal geographical education should be given by others. The memorial he alluded to was about to be published.* He need therefore say nothing further about it, except that it contained suggestions from many sources, notably from the Rev. George Butler, Head Master of Liverpool College, who for many years past had persistently advocated the utility of direct geographical teaching in an ordinary classical education. He had not only done so as a matter of theory, but he had proved it as a matter of fact. The Council had worked for many years, by such means as they could command, to improve the geographical teaching in the public schools, and they felt that if they were successful in their present attempt with the Universities, geography would have a fair chance of being included in an ordinary English education, and the future generations of Englishmen would know more than their predecessors about this globe over which their colonists, merchants, soldiers, sailors, missionaries, and travellers were spread more widely than those of any other nation. He would now call upon Professor Geikie to read his lecture on Geographical Evolution. Mr. Geikie and the Royal

* Vide the April number of the 'Proceedings,' p. 261.

Geographical Society were alike linked by strong chains of association with their memorable former President, Sir Roderick Murchison. Mr. Geikie now held that chair of Geology in Edinburgh which Sir Roderick founded on the implied understanding that Mr. Geikie was to be the first of its occupants, and it was to Mr. Geikie that Sir Roderick assigned by will the duty of writing his biography. They all knew with what skill and judgment that biography had been written. He was therefore sure that they would listen to the lecture not only with the respect due to so eminent a geologist, but with feelings of personal interest.

The following lecture was then read by its author :—

On Geographical Evolution. By Professor Archibald Geikie, F.R.S. (Will be published, with remarks of speakers, in the June number of the 'Proceedings'.)

ANNOUNCEMENTS.—At the meeting of the Society, May 10th, the second of the Science Lectures of the Session will be delivered, by Professor G. Rolleston. Subject: "The Modifications of the External Aspects of Organic Nature produced by Man's Interference."

The anniversary meeting, for the election of President and Council for 1879-80, and other business, will be held on Monday, May 26th, at 1 P.M. At the Anniversary Dinner of the Fellows and their friends in the evening of the same day at Willis' Rooms, the chair will be taken by the Right Hon. the Earl of Northbrook.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—April 4th, 1879: M. DAUBRÉE in the Chair.—It was announced that the Geographical Society of Montpellier had communicated the Statutes relating to the General Congress of French Geographical Societies, which is to take place on the 28th of August next at Montpellier. In connection with the Congress there is to be an Exhibition of objects illustrating the study of the Geographical Sciences.—A telegram from the Governor of Senegal was communicated by the Minister of Marine, announcing that M. Paul Soleillet had arrived at Podor on the 14th of March, in excellent health. He had not been able to get beyond the town of Segou Sikoro, which he had quitted on the 20th of January. King Ahmadou gave as his excuse for stopping him the danger of the Makina route. M. Soleillet was preparing to try the route via Tichytte, but for this he would unfortunately be obliged to wait several months at St. Louis.—A letter from M. J. van Volxem was read, in which he stated his belief that he had discovered at Petrofsk, a port of Daghestan, on the face of cliffs situated about two-thirds of a mile from the edge of the Caspian, traces left by the former high level of the water, which afford data by which to estimate the amount of its subsidence. The marks are about 295 feet above the present level of the Caspian.—M. Simonin then addressed the Society on the subject of the approaching meeting of the Commissioners nominated to consider and decide on the various projects for an interoceanic canal through the American Isthmus, which meeting is to take place in the Great Hall of the Society on the 15th of May next. He passed in review all the schemes in reference to the Isthmus, from the times of Columbus and Balboa, dwelling upon the more recent canalisation project associated with the name of Lesseps (who was present at the meeting). As judge in the competition of routes, M. Simonin showed his impartiality by declaring his preference for that of Nicaragua, which avoids the locks and tunnel inevitable in all the others that had been proposed, particularly those of the Darien Isthmus.—With reference to this, M. Dessaignes exhibited a fan made in Madrid between the years 1796 and 1808, on which was represented a line of canal passing through Nicaragua. The drawing, accompanied by a long legend, was the work of a

Frenchman, M. de la Bastide, the author of the canal project.—Before the conclusion of the meeting, M. de Quatrefages gave some news of the Belgian African Expedition. MM. Cambier and Dutrieux were still at Tabora on the 30th of January.

Geographical Society of Berlin.—April 5th, 1879: Dr. NACHTIGAL, President, in the Chair.—The President announced the death, on the 4th inst., of the renowned meteorologist, Professor Dove, adding a few words regarding the great services rendered by the deceased to the Berlin Society, of which he had been Honorary President since 1873, after having served as President during a series of years, in alternation with Carl Ritter and Dr. Barth. Dove's labours in the field of terrestrial physics would be dilated upon at a subsequent meeting, by a member who had special qualifications in this department of science.—Recent letters from members of the German African Expedition were then read, received only a few hours before the meeting. First, Gerhard Rohlfs had reported that he had left the Sokna Oasis on the 11th March, and had reached the Sella or Zeila Oasis. From the latter place he would direct his course to the oases Djalo and Kufara, the latter of which, inhabited by the fanatical Senussi, had not yet been visited by a European. This reached, he intended next to proceed to Wadjanga, the position of which was entirely unknown, and thence he would endeavour to reach Wadaï, through the country of the Bodejat, concerning which Nachtigal had obtained some information. His caravan was furnished with its own camels and iron water-tanks, which had proved so effective in his former expedition through the Libyan Desert; so that he hoped that the difficulties of the journey through the desert would be happily surmounted. Dr. Stecker, the scientific assistant in the expedition, had sent an accurate topographical survey of the Djofra Oases, on the scale of 1:100,000. The Djofra consists of three oases separated from each other, viz. Sokna ($28^{\circ} 55' 46''$ N. lat. and $16^{\circ} 15'$ E. long. from Greenwich), Hon ($28^{\circ} 57' 48''$ N. lat.), and Uadan ($28^{\circ} 57' 12''$ N. lat.). These oases were bounded on the north by Jebel Machrik, Jebel Hon, and Jebel Uadan; on the south by Jebel Ssoda, the highest peak of which, Gannassa, was 2000 feet above the level of the sea.—In West Africa, Dr. Buchner had written from Pungo Andongo and Malange, on the 9th February, giving a detailed account of the commercial and social condition of St. Paulo. He mentions that the diminution of the rainfall in recent years is undoubtedly the cause of the increase of fever in the place. Buchner's determination of the latitude of Dondo differs only a little from Schütt's estimate; the latitude of Malange he states to be $9^{\circ} 32' 36''$ S. Regarding the geological nature of the ground at Pungo Andongo, Buchner writes that the statements previously made to the effect that it is of volcanic formation are entirely wrong: the rock is conglomerate, the masses containing hollow spaces in their interior. No further news had been received from Schütt, and it was supposed he was travelling in a north or north-east direction beyond Kimbundu, in company with the Portuguese merchant Saturnino.—A paper was read "On the Divisions of the Ocean," by Dr. Krümmel.

Imperial Geographical Society of St. Petersburg.—March 19th, 1879: M. P. DE SEMÉNOV, Vice-President, in the Chair.—The Secretary read a summary of the report presented by Baron Aminof, chief of the Expedition charged with the survey of the water-parting between the Ob and Yenisei rivers. The Expedition had been employed in this great work the whole of last summer. M. Aminof ascended the Kas, a tributary of the Yenisei, to Lake Bolshoi, whilst his colleague and assistant engineer, Lipin, explored the rivers Iziovi and Derevanni, belonging to the Ob system. The exploration of these rivers and the narrow belt of intervening country establishes the feasibility of uniting their waters. A large-scale route map is one of the results of this expedition, and this map has been reduced to $\frac{1}{1000000}$ for publication. Allusion

was next made to the West Siberian affiliated branch of the Society. Though its existence only dates from the 1st July last year (1878), it has already accomplished good work, both in scientific explorations and geographical literature. Its first report, of which extracts were read, contains an account of two expeditions: 1, Yadrintseff's explorations in Southern Altai; and 2, Slotvsof's researches in the region of Akmolinsk. Yadrintseff started from Omsk, and travelled via Barnaul to Bisk, where he entered the mountains; he performed 4500 versts in two months. The object of Slotvsof's journey was to study the fauna along the chain of hitter-salt lakes (the so-called hitter-salt line) and complete his and Bauni's previous observations on the flora of this country. He started from Omsk on the 5th June for Petropavlovsk, whence he turned south towards the River Ishim, keeping to the old caravan route to Djaiman-tau cone and Lake Kannal-kul. Hence he proceeded to Mounts Yakshi and Yanghiz-tau, where he made excursions on the rivers Akan and Barluku, affluents of the Ishim. He next examined other cones in the vicinity, and turned aside from the direct road to Omsk in order to visit some remarkable stone monuments with inscriptions, 200 versts distant. He reached Omsk on the 1st August, bringing with him valuable collections which he has presented to the museum inaugurated by the West Siberian section, the first volume of whose Journal will shortly appear.—Potanin's Expedition left St. Petersburg on the 2-14th March for Omsk, the *rendezvous*. Hence they will proceed to Bisk, and by the end of April leave for Koshagolsk, Kobdo, Uliunghur, Kossogol, and the sources of the Yenisei. They intend passing the winter at Irkutsk, and devoting the following spring and summer to the exploration of the Khangai Mountains and the country between Urga and Uliassutai.—It was announced that an important expedition is being organised to explore the Uzboi, or desiccated Oxus channel, particularly with reference to its late inundation. H.I.H. the Grand Duke Michail Nikolaievitch, Viceroy of the Caucasus, himself takes the initiative; the department of ways of communication (voies de communication) will select the staff. Two important questions are to be studied by this Expedition: 1, The geological structure of the old river-bed; and 2, The economical advantages likely to arise from the opening of direct water communication between European Russia and Central Asian markets. The Russian Geographical Society has consented to participate, and will depute a geologist to conduct a series of independent observations parallel with those of the main party; and an economist, who will in all probability join a private expedition to start from Samara on the Volga for Tashkend, Ferghanah, Bokhara, the Upper Oxus, and descend by the river to the Khivan oasis.—It was announced that M. Sibirakof, acting in concert with the King of Sweden and Mr. Dickson of Gothenburg, is fitting out a steamer, the *Nordenskiöld*, to proceed in spring to the assistance of her ice-bound and adventurous namesake, the Professor. The *Nordenskiöld* will leave the shores of Sweden early in May, and proceed by way of Suez Canal, Indian and Pacific oceans, and Behring Strait, to find the *Vega*. If she succeeds in this part of her mission, she will have orders to proceed to the mouth of the Lena, there meet Sibirakof's steamer, the *Lena*, take a supply of coal, and return by Behring Strait. An opportunity is offered to two men of science to accompany the *Nordenskiöld*; and the Bremen and St. Petersburg societies have each been invited to nominate one. The choice of the former has fallen on Baron Denckelmann, that of the latter on A. V. Grigorieff, so well known for his works on the White Sea. An interesting fact was mentioned in connection with the old Oxus bed, viz. that Lake Sari-Kamish lies 7 fathoms (i.e. 49 English feet), below the level of the Caspian, and thus forms an extensive hollow or depression, supposed to have been once filled by the lake of Kwaresm (Aral), of which frequent mention is made in history.—A paper was read by M. Voieikof on his travels in Mexico in 1876.

NEW BOOKS.

(By E. C. RYE, *Librarian*, R.G.S.)

EUROPE.

Baker Pasha, Lieut.-Gen. Valentine.—*War in Bulgaria: a narrative of personal experiences.* London (Sampson Low and Co.): 1879, 2 vols., 8vo., pp. 360 and 391, maps, plans.

Included in these notices on account of the large amount of military topographical detail contained in the numerous coloured maps.

ASIA.

Borneo.—(1) *Sketch of the Territory of Sabah in North Borneo*; pp. 11. (2) *Report (by T. S. Dobree) on the Country in the Northern portion of Borneo, lately ceded to Messrs. Dent and Overbeck*; pp. 19. (3) *Report and Analysis of Soils*, by J. Hughes; pp. 7. (4) *Extracts from Sketch of Borneo*, by J. Hunt, and the works of St. John and Medhurst; pp. 40. London (Nichols): 1879, 4to, 2 maps.

Conybeare, H.—*Statistical, Descriptive, and Historical Account of the Bijnor District.* Edited by Edwin T. Atkinson. Allahabad (N.W. Prov. and Oudh Govt. Press): 1878, 8vo., map, pp. 498 [no index].

Bijnor (or Bijnaur) is the most northern district in the Rohilkhand division of the North-Western Provinces, at the foot of the Garwal Hills, and lying between them and the Ganges. Its total area is a little over 1868 square miles, and population 737,153. No special interest attaches to it in any single point of view; but the descriptive account of it given in this volume forms a valuable instalment towards the complete knowledge of our Indian possessions now being steadily aimed at by the Administration. The map is on the scale of 8 statute miles to the inch.

Davis, E. J.—*Life in Asiatic Turkey. A Journal of Travel in Cilicia (Pedia and Trachœa), Isauria, and parts of Lycaonia and Cappadocia.* London (Stanford): 1879, 8vo., pp. 536, maps, pls.

This work contains the record of a journey made during the summer of 1875 in the above-mentioned districts, including a visit to the ruins of the ancient Isaura, to which no traveller has been since Hamilton in 1836. The drawings are original (by the author and Mr. M. Ancketill), and the maps are one of Asia Minor on a small scale, showing its south-eastern portion and the north-western part of Syria visited by the author, and another, on a larger scale (22 miles to the inch), showing the route followed. This was from Mersina (with an excursion to Pompeiopolis, now Mezîrlu) viâ Tarsus, Adana, Mesis (the ancient Mopsuestia), along the Pyramus river (now the Jeihan) to the north of the Giaour Dagh range, to Marash (Germanica), returning to Adana by a still more northern road, cutting the northern affluents of the Jeihan, and visiting Boudroum, Bazaar, and Sis. From Adana, he reached the highlands of Cilicia by the pass of Bozanti (Pylæ Ciliciæ) separating the Allah Dagh and Bulghar Dagh of the Eastern Taurus, and traversed the Lycaonian plains, visiting Oloukishla, Eregli, Ibreez, Devleh, Serpek (the ancient Derbe), and Karaman (Laranda). From the latter place, he first struck north to the Kara Dagh and Maden Shehir (dubiously identified as Lystra), and then went south, again crossing the Taurus range, to Mut (the ancient Claudiopolis), in the valley of the Calycadnus, which he followed in a north-westerly direction to Ermenek. Here he recrossed the Taurus, and after visiting Divantea, reached Isaura, turning west again for Karaman at Ayila, and reaching Mersina viâ the Dumblek Pass. An itinerary of the route is given (p. 527). As might be anticipated from his former works, the author's attention has been chiefly directed to matters of historical and archaeological interest; but he records many observations of present political and economic importance, and very fre-

quently describes in a vivid manner the physical configuration of the regions traversed, with special attention to their natural products and climatic conditions. The views apparently give a faithful representation of the country.

India.—Abstract of the Reports of the Surveys, and of other Geographical operations in India for 1876–77. London (Allen, Stanford, Trübner, Whittingham, Thacker): 1878, large 8vo., pp. 62.

MacGregor, Colonel C. M.—Narrative of a Journey through the province of Khorassan and on the N.W. Frontier of Afghanistan in 1875. London (Allen) 1879, 2 vols., 8vo., pp. 309 and 267, map, pls., woodcuts (no index).

The author's route was Bombay to Sheeraz, Yuzd (with diversion to the north-west to Beeabunnuck and Koor), Tubbus, Birjund, across the Afghan frontier viâ Yezdoon for 50 miles to Pahre, a small village not given on the map, within 27 miles of Herat, where his further progress was stopped; then northwards to Karez, Mushudd (with journey to Surrukhs on the east, 80 miles from Merv, and of which the strategical importance is pointed out), and Kullat, another highly important and naturally impregnable position, from which he turned westward to the Khanate of Durraguz, reaching Shahrood through Mahamadabad, Tawarikh (the small stream at which place is considered the chief source of the Attrik), Koochan, Shirwan, Bujnurd, Sankhas, and Jahurm. He returned to England by Astrabad, Tehran, Rostov, and Vienna. The author's spelling is retained in these names, though at variance with that usually employed, and with his own map. The latter bears no draughtsman's name or scale (it is 1:2,000,000, or 27 geographical miles to the inch), and is somewhat confusing, as the roads marked are much more numerous than those followed by Colonel MacGregor, whose route is not in any way distinguished thereon. Throughout the journey, no opportunity appears to have been lost of taking down all bearings, distances, roads, names, physical features of importance, and other topographical details, which are also often well shown by outline drawings and plans; so that the work cannot fail to be of great value, which would have been materially increased by the addition of an index. Considerable attention is paid to the details of the Khorassan mountain and river systems. On the north of the map, the Kuren Dagħ spur of the Kippet Dagħ range, below Kizil-Arvat, is broken up for the passage of roads and the headwaters of the Sumbar; but no authority is given for this, and the author appears not to have been within 60 miles of the locality. A series of appendices concludes the work, containing instructions as to equipment and outfit for Persian travel, a great number of itineraries, including Mr. Mackenzie's route from Ispahan to Shoostur, with tables of heights and sketch of the river Karum, and a discussion of the political aspects of the Merv question.

Markham, C. R.—Narratives of the Mission of George Bogle to Tibet, and of the Journey of Thomas Manning to Lhasa. 2nd edn. London (Trübner): 1879, 8vo., pp. 362, maps, pls.

Contains the results, hitherto suppressed, of the Pundit Nain Singh's journeys through Tibet, and the translation of documents brought from Tibet by Mr. Bogle, one of which refers to the mythological history and laws of Bhot (Tibet).

Prinsep, V. C.—Imperial India. London (Chapman & Hall): no date, 8vo., pp. 360, pls., maps.

An artist's journals, illustrated by numerous sketches taken at the courts of the principal chiefs in India. Some slight topographical detail is given of localities not frequently visited.

Rice, Lewis.—Mysore and Coorg. A Gazetteer compiled for the Government of India. Vol. iii. Coorg. Bangalore (Mysore Government Press): 1878, pp. 427, map, pls.

Contains a general physical description of Coorg, the Wales of Mysore, its meteorology, flora (especially as to cultivated plants), fauna (more fully than usual), history, inhabitants and their religion, language, and industries, with an

account of the administration, and a short gazetteer alphabetically arranged. Historical and linguistic subjects are also discussed in three appendices. The map is on the scale of 10 miles to the inch, and shows the imperial, district, and proposed roads.

Rosenberg, C. B. H. von.—*Der Malayische Archipel. Land und Leute in Schilderungen gesammelt während eines dreissig-jährigen Aufenthaltes in den Kolonien. Mit einem Vorwort von Professor P. J. Veth.* Leipzig (Weigel): 1879, 8vo., pp. 615, map, plan, pls., woodcuts. (*Williams & Norgate.*)

This is now completed: part 1 refers to Sumatra, 2 to Celebes, and 3 to New Guinea and Java. The omission of an index is a great drawback to the utility of the work, which, from the long experience and scientific attainments of its late author, should be a standard one. It abounds in ethnological matter, and special attention is paid to the plants and birds. A comparative vocabulary is given at the end. The map is an illustrated itinerary of the author's route from Goronkalo to Kwaundang.

AFRICA.

Leared, Arthur.—*A Visit to the Court of Morocco.* London (Sampson Low and Co.): 1879, 8vo., pp. 86, map, illustrations.

Dr. Leared visited Mequinez in 1877, being attached to the Portuguese Embassy. His route was from Tangier along the coast southwards to Larache, then following the Lucos to Alcaassar, and striking south-east across the Sebou, below Muley Edris. From Mequinez he went to Fez, returning to Alcaassar and Tangier by another route more to the north. He describes the nature of the country traversed, and gives a detailed itinerary, with temperatures. In an appendix are the author's reasons for identifying the ruins called Cassar Pharaon, about a mile from Muley Edris, and 12 miles N.E. of Mequinez, as the ancient Roman city Volubilis.

Marche, Alfred.—*Trois Voyages dans l'Afrique Occidentale. Sénégal, Gambie, Casamance, Gabon, Ogooué.* Paris (Hachette): 1879, 12mo., pp. 376, maps, pls. (*Dulau.*)

The author first visited the West Coast in 1872; his second voyage was with the late Marquis de Compiègne, who published its results; and in 1865 he went for the third time, as naturalist to Savorgnan de Brazza's expedition. The narrative is for the most part personal.

Roberts, Rev. C.—*The South-African Traveller's Handbook, containing Zulu Kafir, Xosa Kafir, and Dutch, for a large number of useful English words, sentences, and dialogues, for the use of the Army and the Navy.* London (Harrison): 1879, 12mo., pp. 172.

Also contains a brief outline of the Zulu-Kafir grammar. Prepared for the Intelligence Branch, Quartermaster-General's Department, Horse Guards, War Office.

Wild, G.—*Von Kairo nach Massaua. Eine Erinnerung an Werner Munzinger.* Olten ("Volksblatt vom Jura"): 1879, 12mo., pp. 79, portrait, pls., map.

Contains also a Preface, by P. Dietsehi, on Munzinger's career. The map is of Massowa and the Bogos country, after Petermann.

GENERAL.

Bainier, P. F.—*La géographie appliquée à la marine, au commerce, à l'agriculture, à l'industrie, et à la statistique.* Paris (Belin): 1879, 8vo., pp. 912. (*Dulau.*)

Beauvoir, Le Comte de.—*Voyage autour du Monde.* Paris (Plon): 1879, 3 vols., large 8vo., maps, illustrations. (*Williams & Norgate.*)

An illustrated edition of the voyage (Australia, Java, Siam, Canton, Peking, Yeddo, San Francisco) made in 1866, of which an English translation was published by Murray in 1870.

Behm, E.—*Geographisches Jahrbuch*. VII. Band, 1878. Gotha (Justus Perthes): 1878, 12mo, pp. 665.

Contains accounts of the progress in geographical meteorology, by Prof. J. Hann; of our knowledge of the geographical distribution of animals, by Prof. L. K. Schmarda, and of plants by Dr. O. Drude; of the latest progress in the measurement of the arc of the meridian in Europe, by Prof. G. Bruhns; of population statistics, by J. C. F. Nessman; of ethnological discovery, by Prof. G. Gerland; papers on the commerce of the world, and the most important commercial products, by Dr. Karl von Scherzer; on the results of the most recent deep-sea investigations, by Dr. G. von Boguslawski; on the present position of systematic geography, by Prof. H. Wagner; Geographical Societies and Publications, by Dr. Behm; latitudes and longitudes of 120 observatories, by Prof. A. Auwers; and tables of reductions of English fathoms into metres and *vice versa*.

Berthelot, Sabin.—*Vitalité des Mers*. Paris (Baillière): 1879, sm. 8vo., pp. 320. (*Williams & Norgate*.)

A somewhat rhapsodical discussion of the various theories and records of oceanic circulation, with special reference to the Arctic regions.

Columbus.—*Los Restos de Colon*. Informe de la Real Academia de la Historia al Gobierno de S. M., sobre el supuesto Hallazgo de los Verdaderos Restos de Cristoval Colon en la Iglesia Catedral de Santo Domingo. Madrid (Tello): 1879, 12mo., pp. 197, pls.

Documents, &c., in support of the supposed discovery of the remains of Columbus in the Cathedral of Santo Domingo; after a discussion of which, signed Manuel Colmeiro, the affair is considered as a pious fraud, in no way disturbing the belief that the great traveller's bones are really deposited in the Cathedral of Havana.

Desor, E.—*La Forêt Vierge et le Sahara*. Paris (Sandoz): 1879, 12mo., pp. 244, map, pls. (*Williams & Norgate*.)

"*Mélanges scientifiques*," referring to Lake Michigan and the Eastern Sahara (of which the map is stated to be on the scale of 1:5,000,000,000!).

Gray, The Ven. J. H.—*A Journey round the World in the years 1875–1876–1877*. London (Harrison): 1879, 8vo., pp. 612.

The author, Archdeacon of Hong Kong, came to England from that settlement via Singapore, Calcutta, Kurrachee, and the Gulf, and returned by the United States and Japan. He discusses the usual objects of interest, but departed from the ordinary routes whenever able to do so, especially in Cambodia, where he journeyed into the interior to the great lake of Thay-Lay-Sap, Siamrap, Angor-Wat, and Angor-Tam.

Lawson, W.—*Manual of Modern Geography*. London (Collins): 1878, 12mo., maps, illustrations.

Maunoir, C., and Duveyrier, H.—*L'Année Géographique*. Revue Annuelle des Voyages de Terre et de Mer, des Explorations, Missions, Relations et Publications diverses relatives aux Sciences Géographiques et Ethnographiques. Deuxième Série. II. (Seizième Année, 1877.) Paris (Hachette): 1879, 12mo., pp. 590.

In addition to the usual contents of this work, the present volume contains two maps (published by the French Geographical Society), one containing Stanley's African routes, 1874–77, the other Wiener's routes in Peru and Bolivia, 1877, both on a small scale.

Moseley, H. N.—Notes by a Naturalist on the 'Challenger,' being an account of various observations made during the voyage of H.M.S. 'Challenger' round the World, in the years 1872–1876, under the commands of Captain Sir G. S. Nares,

R.N., K.C.B., F.R.S., and Captain F. T. Thomson, R.N. London (Macmillan): 1879, 8vo., pp. 620, chart, pls., woodcuts.

Another addition to the somewhat long list of publications resulting from this voyage, and which, if originally issued simultaneously and in a uniform manner, would probably have caused its history to exceed in interest any of the voluminous chronicles of similar expeditions undertaken officially by foreign governments. Mr. Moseley's book is full of interest to the zoologist, and in a lesser degree to the botanist: he makes many observations on the prominent physical features both of the seas traversed and the lands visited, and loses no opportunity of discussing points bearing upon geographical distribution and the development of man, animals, and plants. The chart (enlarged from Dr. Wild's 'Thalassa') shows the track of the ship, with coloured contour of the bottom of the ocean. Lists of books and papers by naval officers and members of the civilian staff of the Expedition, and of papers by authors not members of it, with reports on the botanical collections, are given at the end.

Saint-Martin, Vivien de.—Nouveau Dictionnaire de Géographie Universelle. Paris (Hachette): 1879, 4to., fasc. 10, pp. 721–800. (*Williams & Norgate.*)

The above-named part of this combination of Text-book and Gazetteer (combining Physical, Political, Economic, and Historical Geography, Ethnology, and Bibliography, arranged alphabetically) has reached the description of Corea.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Airey, J.—Railway map of the Cumberland and Westmorland districts, certified by the Companies. Scale 1:125,000 or 1·7 geographical mile to an inch. J. Airey, London, 1879. (*Stanford.*)

Bartholomew, J.—Parliamentary Map of the British Isles, showing the political representation of all counties and divisions of counties, parliamentary boroughs and universities in the British House of Commons. Scale 1:2,261,388 or 31 geographical miles to an inch. 1879. (*J. Bartholomew.*)

Clérot, Victor.—Nouvelle Carte complète de tous les chemins de fer de l'Europe, contenant les grandes et petites stations, les lignes télégraphiques de grande communication, et le service complet de tous les paquebots dans la Mer Méditerranée, leurs points d'escales et leurs communications dans la Mer Rouge, par le Canal de Suez. Scale 1:1,850,000 or 24 geographical miles to an inch. Clérot, Paris, 1879. (*Dulau.*)

Dépôt de la Guerre.—Frontière des Alpes. Scale 1:80,000 or 1 geographical mile to an inch. Sheets 33 Mt. Viso, 43 St. Étienne, 48 St. Sauveur, 49 St. Martin-Lantosque, 53 Puget-Thénières, 54 Sospel, 58 Grasse, 64 Antibes. Dépôt de la Guerre, Paris. (*Stanford.*)

Hauslab, Sr. Excellenz F.Z.M. R. von.—Hypsometrische Uebersichts-Karte von Bosnien, der Hercegovina, Serbien und Montenegro; die horizontalschichten gezeichnet von Sr. Excellenz F.Z.M. R. von Hauslab. Scale 1:600,000 or 8 geographical miles to an inch. Imperial and Royal Printing Department, Vienna. (*Stanford.*)

The elevations above sea-level are shown in this map by nine shades of drab, and range from sea-level to 6000 feet. Capitals, cities, villages, railroads, roads, monasteries, forts, castles, and boundaries are very clearly shown.

Hirschwald, Dr. J.—Geologische Wandkarte von Deutschland, bearbeitet von Dr. J. Hirschwald. Scale 1:1,000,000 or 13·6 geographical miles to an inch. F. Graap, Leipzig, 1879. (*Williams & Norgate.*)

Keil, W.—Saale und Werra. Thüringer Wald, Frankenwald, Harz, &c. Scale 1:150,000 or 2 geographical miles to an inch. 12 sheets. Fischey, Cassel, 1878. (*Dulau.*)

Kiessling.—Reisekarte von Mittel-Europa. Scale 1:2,100,000 or 28·3 geographical miles to an inch. Chromo-lithograph. Kiessling, Berlin, 1878. (*Dulau.*)

K. K. Milit.-Geogr. Institute.—Generalkarte von Central Europa, herausgegeben vom K. K. Militär-Geo. Institute. Scale 1:300,000 or 4·1 geographical miles to an inch.—The following sheets have just been published:—A 1, Manchester; A 2, Birmingham; A 8, Limoges; C 9, Lyon; C 10, Avignon. Artaria, Vienna. (*Dulau.*)

This map is now completed, with the exception of sheet A 11, Perpignan. It consists of 192 sheets, and comprises that portion of Europe between latitudes 55° 40' N. and 41° 53' N., and between longitudes 30° 44' E. and 1° 6' W.; it therefore includes all those countries lying between Smolensk in Russia and Cape St. Stefano in Turkey (on the east), and Preston in England and Barcelona in Spain (on the west). All canals, railroads, and every other means of communication are laid down with great minuteness, the sheets of England apparently being reductions of the Ordnance Survey. The south-eastern sheets of this map were in great request during the late Russo-Turkish war, as being accurate and drawn on a convenient scale, also on account of all the mountain passes being clearly shown, and their elevations given. The sheets of this map are sold separately, and the index map enables anyone desirous of obtaining a map of any portion of Central Europe, on a scale of 4 geographical miles to an inch, to see at a glance what sheets are required.

Michel, Ch.—Karte der Alpen, Sekt. 4, 6 und 16. Photo-lithograph. Finsterlin, Munich, 1878. (*Dulau.*)

Norvége, L'Institut Géographique de.—Norway—Generalkart, blad V; scale 1:400,000 or 5·5 geographical miles to an inch. Amtskarter: Nordre Bergenhus S.V. and N.V. blad. Tromsø, N.Ö. and N.V. blad; scale 1:200,000 or 2·7 geographical miles to an inch. Topografisk kart: 29b Sogndal, 46b Melhus, 46n Trondhjem; scale 1:100,000 or 1·3 geographical mile to an inch. Geologisk oversigtskart over sydlige Norge; scale 1:1,000,000 or 13·6 geographical miles to an inch. Geologisk kart: 9n Tönsberg, 14b Mos, 14n Kristiania, 19b Hönöfös; scale 1:100,000 or 1·3 geographical mile to an inch. Generalkystkart: 46 Nordsöen, 2 blad; scale 1:1,000,000 or 13·6 geographical miles to an inch. Specialkystkart, 113 Nordfjord til Rundö, 130 Ulfsten til Sövede, 131 Rundö til Lepso, 133 Molde-og Romsdalsfjord, (ny rekke) 1 Gibostad til Rystrom og Hekkingen; scale 1:50,000 or 1·4 inch to a geographical mile.

Prussian General Staff.—Kreiskarten, 1:100,000 or 1·3 geographical mile to an inch. Lith. N. 140: Wirsitz; N. 60: Bütow, à M. 2.—Messstischblätter, 1:25,000 or 3 inches to a geographical mile. Ost-Gruppe, Bl. 2: Virehow; 5: Zippnow; 6: Jastrow; 9: Petznick; 10: Neugolz; 11: Freudenfrier; 12: Betkenkammer; 17: Breitenstein; 18: Alt-Lebehne; 33: Ossowitz; 34: Bromberg; 52: Thorn; 53: Gremboezin; 55: Podgorz; 56: Sehilno.—West-Gruppe, Bl. 61: Gr.-Freden; 62: Lamspringe, 63: Hahausen; 64: Goslar; 65: Einbeck; 66: Gandersheim; 67: Seesen; 68: Zellerfeld; 69: Moringen; 70: Westerhof; 71: Osterode; 72: Riefensbeek; 73: Nörten; 74: Lindau; 75: Giebeldehausen; 76: Lauterberg; 77: Göttingen; 78: Waake; 79: Duderstadt.—Lith. und col. Neumann, Berlin, 1878. (*Dulau.*)

Rome.—Pianta della Città di Roma. Scale 1:8500 or 8 inches to a geographical mile. Libreria, Spithöver. 1879. (*Stanford*.)

Ronchi, L.—Carta delle linee ferroviarie e di navigazione in Italia. Scale 1:864,000 or 11·8 geographical miles to an inch. Ronchi, Milan, 1878. (*Dulaup*.)

Schrabisch, O.—Statist. Situations - Übersichtskarte des Reg-Bezirks Aachen. Scale 1:100,000 or 1·3 geographical mile to an inch. Anbeldr. und color. Jacobi, Aachen, 1878. (*Dulaup*.)

Stanford, E.—Map of Great Britain, showing localisation of the Forces into districts, sub-districts, and brigades, and mobilisation of the Forces into Corps d'Armée. (*Stanford*, 1879.)

Stanford, E.—Political Map of England and Wales.

Political Map of Scotland.

Political Map of Ireland.

As represented in Parliament, March 1879. (*Stanford*.)

ORDNANCE SURVEY MAPS.

1-inch—General Maps:—

ENGLAND (contoured, with elevations marked):—273, 274, 289, 290, 305, 306.

SCOTLAND (Hills): Sheets Nos. 84 and 87.

IRELAND (Hills): Nos. 55, 93, 105, quarter-sheets.

6-inch—County Maps:—

Flint: Nos. 32a and 3a, 6a, 25, 23, 26 and 27 on one.—Flint and Denbigh, Nos. 8 and 9, 9 and 10, 13 and 15, 1 and 2.—Denbigh and Flint, Nos. 22 and 17a.—Sussex, Nos. 9 and 20 (on one), 18, 29, 59, 42, 45, 56, 57, 28, 70, 6, 41, 54, 55, 71, 27, 40, 58, 68, 81, and 83.—Inverness (Island of Skye), Nos. 1, 2, 3, 4, 5, 13, 18, and 45.—Sutherland, Nos. 18, 3, 35, 42, 45, 46, 51, 52, 53, 55, 70, 99a, 37, 68, 47, 56, 57, 62, 63, 67, 74, 78, 80, 85, 61, 64, 65, 66, 71, 72, 75, and 106.—Hertfordshire, No. 43.—Wiltshire, Nos. 73, 78, 81, 82.—Caithness (scale 2 miles to an inch), Index 1. Westmeath (revised sheets), 19, 20, 21, 22.

25-inch scale, with Area Books:—

ENGLAND AND WALES: Parish (Estate) Maps, on the scale of 1:25,000 or 25·344 inches to a mile, or about 1 square inch to an acre.

Berkshire: Ardington, 9 sheets; Beedon, 4 sheets; Cholsey, 15 sheets; Compton, 12 sheets; East Lockinge and ditto, detached, Nos. 2 to 6, 9 sheets; Frilsham, 4 sheets; Hatford, 6 sheets; Moulshford, 6 sheets; Padworth, 5 sheets; Tattendon, 5 sheets; Upton Nervet, 10 sheets; Wantage and ditto, detached, Nos. 3 and 4, 13 sheets; Wasing, 3 sheets; West Hanney, 13 sheets.

Brecknockshire: Ystradfellte (part of), 10 sheets.

Cornwall: Germoe, 4 sheets; Gulval, 12 sheets; Ludgvan, 13 sheets; Madron, 15 sheets; Morvah, 7 sheets; Paul, 10 sheets; Perran Uthnoe, 5 sheets; St. Burian, 16 sheets; St. Hilary, and St. Michael's Mount (formerly extra parochial), 13 sheets; St. Ives, 8 sheets; St. Just, 20 sheets; St. Levan, 8 sheets; Sancreed, 11 sheets; Sennen, 10 sheets; Towednack, 9 sheets; Zennor, 13 sheets.

Glamorganshire: Bishopston, 7 sheets; Bonvilston, detached, 6 sheets; Card-oxton Juxta Neath, and Neath Hundred (part of), 48 sheets; Eglwys-Brewis, 4 sheets; Llanmaes, 6 sheets; Nicholaston, detached, 3 sheets; Oystermouth, 11 sheets; Penard, detached, 10 sheets; St. Andrews Major, and Sleeping Moors, 10 sheets; St. Hilary, 6 sheets; St. Mary Church, 4 sheets.

Gloucestershire: Forest of Dean (formerly extra parochial) and Newland, detached, Nos. 1 to 16, 47 sheets; Little Dean; Abinghall, detached, Nos. 1, 2, and 3; Flaxley, detached, Nos. 1 and 2; Westbury-upon-Severn, detached; Hinders Lane (formerly extra parochial) and ditto, detached, Nos. 1 and 2, 6 sheets; Ruardean and Mitcheldean, detached, 8 sheets.

Hertfordshire: Ardeley, 6 sheets; Aspenden, 6 sheets; Albury, 6 sheets; Bygrave, 5 sheets; Brent Pelham, 4 sheets; Cottred, 8 sheets; Furneux

Pelham, 9 sheets; Hemel-Hempstead, 16 sheets; Meesden, 4 sheets; Puttenham, Drayton Beauchamp, detached, Nos. 3 and 4; Marsworth, detached, Nos. 1 and 2, 6 sheets; Stocking Pelham, 2 sheets.

Monmouthshire: Bedwelty, 14 sheets.

Oxfordshire: Bensington and ditto, detached, Nos. 2 to 11, 8 sheets; Britwell Salome and Newton, detached, Nos. 1, 2, and 3, 4 sheets; Burcot, 3 sheets; Checkendon, 10 sheets; Dorchester, 5 sheets; Ipsden, 11 sheets; Mongewell, 6 sheets; Nettlebed and Ewelme, detached, No. 13, 4 sheets; Newnham Murren, 6 sheets; North Stoke, 3 sheets; Nuffield, 7 sheets; Warborough, 3 sheets; Watlington, 11 sheets.

Staffordshire: Audley, 10 sheets; Biddulph, 13 sheets; Madeley, 9 sheets.

Wiltshire: Alderbury, detached, 4 sheets; Amesbury, 9 sheets; Woodford, 7 sheets.

SCOTLAND.—Moorlands and uncultivated grounds are published only on the 6-inch scale.

Inverness-shire: Bracadale, 9 sheets; Duirinish (part of), 45 sheets; Kilmuir, 24 sheets; Portree, 16 sheets; Snizort, 22 sheets; Strath, 16 sheets.

Town Plans.—On the scales of 1:500 or 10·56 feet to a mile; 1:1056 or 5 feet to a mile; and 1:2500 or 25·344 inches to a mile.

ENGLAND AND WALES: Altrincham, scale 1:500, 24 sheets; Camborne, scale 1:500, 9 sheets; Penzance, 1:500, 16 sheets; London, scale 1:2500, sheet 45; St. Ives, scale 1:500, 10 sheets.

SCOTLAND: Edinburgh, scale 1:1056, new sheets, Nos. 1*a*, 14*a*, 19*a*, 22*a*, and 26*a*; revised sheets, Nos. 2, 10, 11, 12, 14, 19, 20, 22, 26, 27 and 36.

IRELAND: Mallow, scale 1:500, 20 sheets. (*Stanford, agent.*)

AFRICA.

Intelligence Branch, Quartermaster-General's Department.—Military Map of Zulu-Land, from most recent information; compiled and lithographed at the Quartermaster-General's Department, under the direction of Captain C. E. Grover, R.E. Scale 1:316,800 or 4·3 geographical miles to an inch. (*Stanford, agent.*)

Properly speaking this is a sketch map, and in using it for the purpose of taking a compass bearing from one place to another, it must be borne in mind that the border of the map does not show north and south; the true north being indicated by a line running from Point Durnford, passing through a position in latitude 28° S. and longitude 32° E. On this map will be found a table of north and south stars, for finding the latitude by meridian altitudes, during the month of May, in Zulu-Land.

The latitude and longitude of all the most important positions, as well as mission stations, kraals, and main tracks, are laid down. Native tribes and the number of the male population are also given.

Sketch of the road from Fort Tencos to Ekowe, by Captain H. G. MacGregor, 29th Regiment. Scale 1:316,800 or 4·3 geographical miles to an inch. Lithographed at the Intelligence Branch of the Quartermaster-General's Department, 1879. (*Stanford, agent.*)

On this plan the distances between the different stations in miles and the physical features of the country are shown, as are also all the mission stations and their nationalities. (*Stanford, agent.*)

Sketch of Ground about Ekowe, by Captain H. G. MacGregor, 29th Regiment. Scale 275 yards to an inch. (*Stanford, agent.*)

Fort Ekowe, with general section of parapet. Scale 100 feet to an inch. Intelligence Branch, Quartermaster-General's Department, 1879. (*Stanford.*)

Mullens, J., D.D., F.R.G.S.—Map of Madagascar, from the latest surveys, by Joseph Mullens, D.D., F.R.G.S. Scale 1:750,000, or 10·3 geographical miles to an inch. London Missionary Society, 1879.

This map shows the surveys of Dr. Mullens, and the routes of all recent travellers.

Société de Géographie.—Région des cours supérieurs de l'Ogôoné, de l'Alima et de la Licona reconnue par MM. P. Savorgnan de Brazza, Enseigne de Vaisseau, et N. Ballay, Médecin de la Marine, 1876–78. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Société de Géographie. Paris, 1879.

This is only a provisional map.

Weller, Edward.—War Map of Zulu Land and the adjoining Territories. Scale 1:850,000 or 11·6 geographical miles to an inch. G. W. Bacon & Co. London, 1879. (*Bacon.*)

This map is compiled from the Intelligence Department maps, and Jeppe's map of the Transvaal. The intention of the author of this map seems to have been to bring out the lettering as clearly as possible, and in this he has succeeded.

Wylde, J.—Third edition of Wylde's Military Sketch of Zulu Land, the Transvaal, and adjoining Territories. Scale 1:740,000 or 10 geographical miles to an inch. J. Wylde. London, 1879. (*Wylde.*)

There are many corrections and additions in this edition of Wylde's Map of Zulu Land; as for instance in the direction of the waggon tracks, and the course of the rivers, while the bush-land has been distinguished by being coloured green, and the general hilly character of Zulu Land is also shown by hill shading.

Wylde, J.—Sketch of the attack on the camp of Isandula, January 22nd, 1879. Map No. 2 of Wylde's Zulu War series. (*Wylde.*)

AMERICA.

Colton, C. W. and C. B.—Colton's Map of the States of Virginia, Maryland, Delaware, and West Virginia, and portions of other adjoining States. Scale 1:750,000 or 10·5 geographical miles to an inch. Colton & Co., New York, 1879. (*Stanford.*)

— Topographical Map of Colorado. Scale 1:750,000 or 10·5 geographical miles to an inch. Colton & Co., New York, 1879. (*Stanford.*)

— Map of New Mexico and Arizona. Scale 1:2,150,000 or 29 geographical miles to an inch. Colton & Co., New York, 1879. (*Stanford.*)

These three maps belong to a series of pocket maps of all the states and territories, and also of the several British provinces, Mexico, Central America, and the West Indies, which are being published by Messrs. Colton and Co., of New York, for the use of tourists and travellers. They are all corrected to date, and show with accuracy the railways, canals, and stage routes.

Cubas, A. Garcia.—Carta oro-hidrográfica de la Republica Mexicana. Scale 1:2,200,000 or 30·3 geographical miles to an inch. 4 sheets. Debrag-y-Ca., 1878. (*Dulau.*)

This map, consisting of four sheets, coloured orographically, printed by Erhard, of Paris, was exhibited at the late Paris Exhibition. It shows the limits of states, international limits, roads, railways (existing and projected), mines, cattle stations, capitals of states, and forts, each of which are distinguished by their proper signs or symbols. There is also an inset map on the south-west sheet showing the orography of the country traversed by the railway from Vera-Cruz to the city of Mexico, and a section to scale showing the comparative altitudes of the railway stations and the limits of vegetation. The routes of all the mail steamers, and the length of passages in days and distance are laid down. There is much general information to be gathered from this map, which both as regards cartography, and as a map of Mexico on a convenient scale, supplies a want hitherto very much felt.

Habenicht, H.—Der obere Lauf des Amazonenstroms und seine Peruanischen Nebenflüsse, mit Luftrundelegung der astronomischen Positionsbestimmungen der Peruanischen Hydrograph. Commission, 1868–73, bearbeitet von H. Habenicht. Scale 1:2,200,000 or 30·3 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879, Tafel 5.

Wilson, A. D.—Map showing the Primary Triangulation of 1877-78. Scale 1 : 780,000 or 11·4 geographical miles to an inch. Department of the Interior, U.S. Geological Survey of the Territories, F. V. Hayden in charge, 1879.

CHARTS.

Admiralty.—Charts published by the Hydrographic Department, in January and February, 1879.

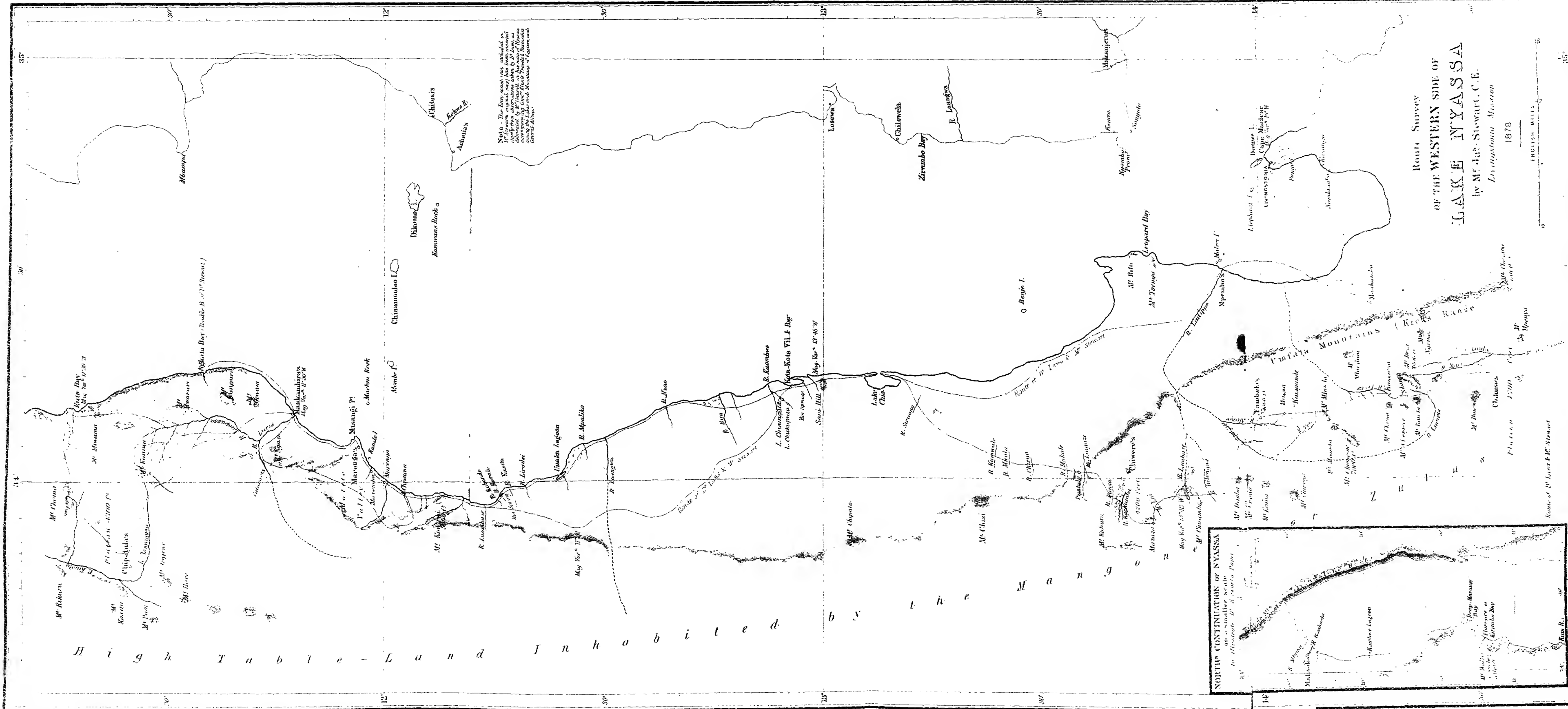
No.	Size.	Inches.	
1056	DE m	= 0·11	Australia, west coast :—Cape Cuvier to Champion Bay, including Shark's Bay—plans, Turtle Bay and Port Gregory.
860	$\frac{DE}{2}$ m	= 2·0	Africa, east coast : Kisimayu Bay.
695	DE m	= 0·5	New Zealand :—Cook Strait.
884	$\frac{DE}{2}$ m	= 4·1	Sea of Marmara :—Artaki Bay.
722	$\frac{DE}{2}$ m	= $\left\{ \begin{array}{l} 1·75 \\ 6·0 \end{array} \right.$	Seychelles Islands :— Approaches to Barachois or Port Victoria, and plan of Port.
851	DE m	= 0·2	Mozambique Channel :—Bassas da India and Europa Island.
849	$\frac{DE}{2}$ m	= $\left\{ \begin{array}{l} 3·0 \\ 6·0 \end{array} \right.$	Australia, south coast :—Sea mouth of Murray River, with enlarged plan of bar.
842	DE m	= 0·15	Bay of Bengal, Malay Peninsula :— Sayer Islands and adjacent coast to Bass Harbour, Malacca Strait entrance, including Salang or Junkseylon Island.
845	DE m	= 0·5	Fiji Islands :—Kandavu passage to Kowata Island, including the Nandi Waters.

1825. Plan of Buckie Harbour added.—209. Plan of Malloo, Popau, Quahquahroo, and Qui harbours added.—2885. Plans of Enseñada and Santo Tomas anchorages added.

EDUCATIONAL.

Putzger, Andree.—Gymnasial-und-Realschul-Atlas, in 48 karten. Bielefeld und Leipzig, verlag von Velhagen und Klasing, 1879. (*Dulau.*)

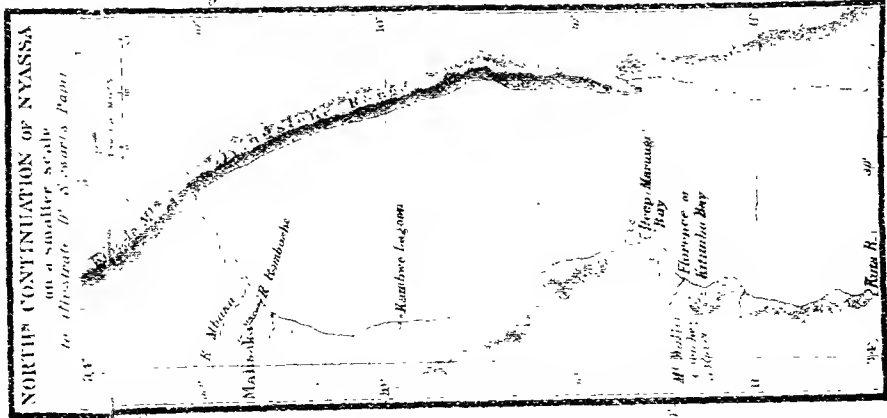
This is a Physical, Political, and Astronomical atlas, consisting of 48 maps, which are printed on both sides of the paper, as by this means it is reduced both in price and bulk. Great attention has been given to the orographic and hydrographic maps, the heights and depths being very clearly shown by different shades of colour, and figures. Each of the general maps has a graduated scale for the different parallels of latitude, and they are placed in pairs, Physical being on one side, Political on the other. In the map devoted to volcanic and coral islands are several inset maps, giving bird's-eye views of the craters, and sections of remarkable coral islands and reefs; the plan of giving inset maps of points of special interest is followed throughout the atlas. There are separate maps of the human races, and religion of man, the distribution of animal and vegetable life, rain maps, isothermal and wind maps, and an ocean current chart, on which are given passages and trade routes, with the usual number of days occupied in making them. There are a few slight errors in some of the maps, as for instance in the map of Africa, Zulu Land is coloured as being British territory. The errors that occur are, however, unimportant, and it is indeed astonishing that an atlas containing 48 maps (all of which are well executed, extremely clear, and have the colours well chosen) could be offered to the public for 3 marks, or at a cost of less than three-farthings a map. There can be no doubt that, with its low price, and the great amount of information it contains, this atlas will recommend itself to students and those engaged in tuition.



Note - The East coast (not included on Mr. Stewart's original map) has been surveyed by Mr. J. S. Stewart, C.E. in the month of May 1878, and the results are shown on this map. The route of the survey is shown by a dotted line. The route of the survey is shown by a dotted line.

ROUTE SURVEY
OF THE WESTERN SIDE OF
LAKE NYASSA
by Mr. J. S. Stewart, C.E.
Livingstonia Mission
1878

ENGLISH MILES



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

The Annual Address on the Progress of Geography.

By C. R. MARKHAM, C.B., F.R.S., Secretary.

(Read at the Anniversary Meeting, May 26th, 1879.)

SINCE our last anniversary, although no brilliant geographical achievement can be recorded, yet much valuable work has been done, and steady, persevering efforts have been and are being made to extend and complete our knowledge in all directions. These efforts have not been less conspicuous on the part of scientific surveyors, whose work it is to build up and furnish the geographical edifice, than on that of the pioneer explorers who lay the foundations. There is no great leap forwards to chronicle, but there is a story of distinct and marked progress during the year from May 1878 to May 1879.

In Asia this is especially the case. The advance of our troops across the Afghan frontier, by three different routes, has had two useful geographical results. All existing information, much of which had been thrown aside and forgotten, is now brought together in the large-scale map by Major Wilson, and in the valuable memoirs by General Kaye, Major Raverty, and others. On the other hand, the gallant surveyors are doing good service in the field. With General Browne's force was Major Tanner, and also Captain Samuels, who, as General Thuillier has told us, did excellent work at Ali Musjid, with his plane-table before him, under the fire of twenty-four of the enemy's guns, but who has since fallen a victim to the climate. Captain Woodthorpe came from making a valuable survey in the Miri Hills and on the north-east frontier, to join the column of General Roberts. The Candahar column was accompanied by Captain Rogers, who has been instructed to continue the triangulation from the Indus, up the Bolan to Quetta. Major St. John, an ardent geographer, is the political officer at Candahar; and Captains Holdich and Campbell, both distinguished surveyors, have also set out for Afghanistan to join the army. Thus, so far as geography is con-

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earned, the operations on the north-western frontier of India are yielding valuable results.

We have already received some of the fruits of these labours in the field. We have learnt that Colonel Prendergast, on the 24th of April, entered the Chachar Pass, through the Sulimani Mountains, and reached a place called Fazalkot, beyond the Vatakri Plain, on the Tal-Chotiali route from the Indus Valley to Candahar. This Vatakri Plain is fertile and well watered, 4000 feet above the sea, and commands the passes into the country of the Mari tribe. On March 8th General Biddulph left Candahar to return by the same route, and the details furnished by him and General Nuttall in returning from Candahar to Dehra Ghazi Khan form a very valuable addition to the geography of south-east Afghanistan. Lieutenant R. C. Temple, of the 1st Gurkhas, has constructed a map, and will furnish us with an account of this previously unknown country. Another route from Kelat to the sea-coast, at Sonmiani, a distance of 237 miles, has also been examined; and, as it completely turns the Bolan Pass, its importance is obvious. The fact that the waters of Lake Ab-istada overflowed into the northern branch of the Arghasan River, a tributary of the Helmund, in the course of the present year, has been brought to our knowledge through the advance into Afghanistan. This was a doubtful point, and it had generally been supposed that the Ab-istada had no outlet; so that its ascertained connection with the Helmund system reduces the number of inland basins in the interior of Asia. These are but a few of the first gleanings from the rich harvest which the surveyors in Afghanistan will soon garner for us.

An important advance towards the solution of one of the chief Asiatic geographical problems has been made this year, namely, the discovery of another section of the unexplored course of the Bramaputra. One of Colonel Walker's indefatigable native explorers has traced and surveyed the Sanpu, the great river of Tibet, for 200 miles beyond Chetang, the most eastern point to which it had hitherto been followed. Here the river turned southwards into the hills; and between this point and that reached by Captain Wilcox on the Dihong, in his journey from the Assam Plain in 1825, there is a comparatively short gap. But in that interval there is a fall of 8000 feet and upwards, so that the complete discovery of the still unknown portion will probably disclose a scene of wonderful sublimity—one of the last, and perhaps the grandest, of nature's secrets.

In Persia much useful work has been done within the year. The native information collected by Colonel Ross, the political resident at Bushire, shows that the River Kara-Aghach (the Sitakos of Nearchus), which is placed doubtfully on Major St. John's map, is simply the upper course of the Mun, a river falling into the Persian Gulf 60 miles south of Bushire. Captain the Hon. G. Napier has again explored the mountainous region north of Khorassan and the basin of the Atreck, and has

brought home some new geographical information of considerable interest. Our late curator of maps, Captain George, will be pleased to hear that Captain Napier took his barometer to the summit of the Peak of Demavend, and observed with it. Colonel MacGregor's work on Khorassan furnishes better information than we previously possessed respecting the route from Yezd to Herât; and a further addition to our knowledge of Persian geography will shortly be made by Señor Rivadeneyra, whose work is to be published at Madrid.

The labours of the Inland Mission in China are adding steadily to our information respecting the interior provinces. The missionaries, who are intelligent observers, travel on foot and in native dress; and the map prepared by Mr. Stanford for the Mission, with their routes, shows that they have journeyed far and wide into the western and north-western provinces. Mr. McCarthy, one of these intrepid men, has lately given us an account of the remarkable journey he made from Shanghai to Bhamo, through Yünnan, Tali fu, and Momein, from December 1876, to August 1877, a distance of 3000 miles. The most gratifying feature in his travels is the civility and hospitality with which he was treated by the Chinese people throughout the whole route.

The pioneers of geography are thus doing their part most nobly in Asia. The scientific surveyors are no less diligent, and continue to turn out a good portion of accurate work from year to year. The proceedings of the great Trigonometrical, Revenue, Topographical, and Marine Surveys of India were fully noticed in the last Anniversary Address, and a few copies of the later reports have only just reached this country, unfortunately not in time for notice in this review. The Department quite recently established in India for Marine Surveys, however, calls for further special notice. Under the very able superintendence of our associate, Captain A. D. Taylor, a great and most desirable change has been effected. In March 1861, the marine surveys of India were abandoned, and from that date until the establishment of the Indian Marine Survey Department, in 1873, the surveys along coasts which were undergoing periodical changes were neglected. Now there is a complete alteration: efficiency and activity have taken the place of sloth and neglect. Captain Taylor himself visits and inspects the various ports of India, sees after the necessity for new surveys, owing to the shoaling of bays, and reports on all requirements connected with navigation; while his talented assistant in the compiling and drawing branch, Mr. Carrington, prepares charts, hydrographic notices, wreck charts, and light-house lists; and a Chart Depot has been established at Calcutta, where no less than 3630 copies of charts were issued in 1877-78, of which 3279 were produced in India. The great want of the Department was a suitable surveying vessel, and this want will soon be supplied. A steamer is being built at Bombay, of 584 tons, fitted with chart and drafting room, and with all the appliances for deep-sea sounding and dredging. She

is named the *Investigator*, and will be ready for sea next year. Six years ago there was total neglect of all this useful and necessary work. The change is most gratifying, and must be welcomed as an important step in the interests of geographical science.

While our own countrymen have been thus active in the southern half of the great continent of Asia, both as explorers and surveyors, the Russians have also contributed largely to our science, and admirable explorers have not only followed closely on their armies, but have often preceded them. The recent journey of M. Mushketov, a mining engineer well known for his researches in the Tian-Shan, to the Alai, furnishes results of great value. For M. Mushketov is a geologist and a trained observer. He considers that the lofty elongated valley of the Alai, 8000 to 12,000 feet above the sea, belongs to the same class as the valleys of the Tian-Shan, which once served as reservoirs for mountain drainage, since dried up. The former condition of these long troughs is illustrated by the existing lakes of Issyk-kul and Kara-kul. M. Mushketov crossed the Trans-Alai Range and reached the banks of the Muk-su, visiting the Kara-kul lake, 13,200 feet above the sea, then returning by the Alai and Osh to Ferghana. His observations on the structure of the Pamir are valuable and suggestive; and he specially doubts the existence of Humboldt's meridional chain of Bolor, believing the mass of peaks which are supposed to form it to belong to distinct systems.

The mountainous country south of Bokhara has been recently visited by M. Maief, whose journey lasted from the 9th to the 29th of August, 1878. He explored the direct road through the mountains, over the Akbash Pass, and through the valley of the Kerchak-daria, a large mountain stream which was previously unknown. He then crossed the mountains by the Tunga-davan Pass, a defile which intersects the south-westernmost of the Hissar chains. He returned by another route, and thus added considerably to the geographical knowledge of the mountains of Bokhara. This was the second excursion M. Maief has made in this direction from Tashkend, the first having been in 1875.

A very interesting journey, resulting in a map on the scale of 33½ miles to an inch, was made by Colonel Grodekof last year, from the Patta-Kissar ferry to Herat. His route led him first over a tract frequently overflowed by the Oxus, and covered with rushes and brushwood, and then across a waterless, sandy plain. Beyond is the chief town of Afghan Turkistan, called Mazar-i-Sharif, with a population of 25,000 Uzbeks and Afghans, gun factories, canon foundries, and manufactories of swords and knives. Forty miles further on the road crosses the river of Balkh, beyond which there is a wide extent of cultivated land. Colonel Grodekof thence advanced to the valley of the Saripul River, and over a rocky range which divides it from that of the Sangalak, and then through cultivated ravines and defiles to the town of Maimenah.

From Maimenah the road passes over a series of mountain spurs, where there is capital land, and evidences of former cultivation, but all

now deserted. A difficult pass over the Kara-Jangal Range, which runs parallel with the Paropamisus, brought the traveller into the wide Murghab Valley, which is skirted on the right by a high, rocky mountain side, and on the left by low, undulating hills. Colonel Grodekof found it difficult to make his way across the Murghab Valley, owing to the thick grass and rushes which hide the track; for the foot of man seldom treads here. Then commences the ascent of the Paropamisus Range, by a pass which is covered with snow from December to April. After a long descent the road emerges on the plain of Herat, and the city was reached last November. From the ferry over the Oxus at Patta-Kissar to Herat, Grodekof had traversed 466 miles of country. The region he has thus roughly surveyed and described is one of great interest, and was very little known. A complete survey and description of the valleys of the Murghab, of the Heri-rud, and of this portion of the Oxus, is a geographical desideratum which should be filled up, and Colonel Grodekof has made a most valuable contribution to our knowledge in this direction.

Another important journey is that of M. Oshaniu, who, travelling from Samarcand to Hissar, and then exploring the hitherto unknown route through Kara-tegin, reached the Muk-su at Altyn-Mazar, near the point where the river is formed by the confluence of three streams, the Suk-sai, Kaingdy, and Sel-sai. He took the Sel-sai route, and found that the stream issued from an enormous glacier, ending in a sheer ice-wall 240 feet high. He named it the "Fedchenko Glacier." Finding further exploration impracticable, M. Oshanin returned to Altyn-Mazar, and intended to cross the Taldyk, and so return to Ferghana.

On the side of the Caspian, we hear of a new route having been discovered from that sea to Kungrad, on the Sea of Aral, by the brothers Vanuslim, two enterprising merchants of the Ural. Their caravan is formed by camels harnessed to four-wheel carts carrying forty poods, instead of the sixteen poods which a camel bears on its back. In this way they have traversed the distance between the two seas from Mertvi-Kultuk, on the Caspian, to Kungrad, over a tract where the ground is level and hard, and with a sufficient supply of water. This is an important discovery, which will ensure an easier and less expensive means of communication between Russia and her distant eastern possessions. Meanwhile the operations of Russian troops in the direction of Merv are yielding further geographical results. In his advance from Chikishlar to Khoja-Kileh, and subsequent retreat by way of Chat, during last August and September, General Llomakin has been the means of throwing much light on the interesting region between the Kuren-dagh range of mountains and the south-eastern shore of the Caspian. Sir Henry Rawlinson brought this new information to our knowledge in his very interesting paper on "The Road to Merv," which was read last January, and published in the March number of our 'Proceedings.'

The work of exploring is being pushed forward with unflagging

energy by Russian officers. It is not long since our intrepid gold medallist, Colonel Prejevalsky, returned from the journey for which we have conferred upon him our highest reward. Yet he again started, last February, to undertake an equally important geographical enterprise, accompanied by two young officers, named Eklon and Robaroffsky. They have proceeded by way of Orenburg, Omsk, and Semipalatinsk, to Zaisan, from which latter place they have written in good spirits to say that they would set out on the 1st of April for their great journey, by Hami and Sha-chau, to Lhasa, the capital of Tibet.

On the continent of Africa there have been the same steady persevering efforts to encroach upon the undiscovered area, and these have been made from several different directions during the past year.

The largest unexplored area is now to the north of the equator, from the Congo to Lake Chad, and from the Ogowé, on the western side, to the country of the Nyam-Nyam, visited by Dr. Schweinfurth. From the western coast this unknown region has been entered by the French Expedition under Savorgnan de Brazza, whose very interesting narrative is published in the Bulletin of the French Geographical Society for last February. His expedition has, on the whole, achieved the most important geographical work in Africa, that has been recorded during the present year.

The Expedition, under M. Savorgnan de Brazza and Dr. Ballay, left Bordeaux in August 1875, to explore the whole course of the River Ogowé, reaching Gaboon on the 20th of October. They succeeded in hiring canoes and commenced the ascent of the river in the following year, making their first halt at a village called Lopé. From this station Brazza set out to explore the country of the Fans, a very difficult and hazardous journey. Thence the expedition advanced to Doumé, on the upper part of the Ogowé, where its course is from south-east to north-west. Doumé is about 50 miles south of the equator. After a serious illness Brazza was obliged to return to the coast, but he rejoined his party at Doumé in April 1877, and reached the Poubara Falls in $1^{\circ} 45' S$. Here the Ogowé, flowing from the south, becomes an insignificant stream, and it was not considered necessary to follow its course any further.

But here the most important part of M. Brazza's work commenced. He resolved, in spite of the sufferings he and his party had already gone through, and the diminished stock of provisions, to leave the basin of the Ogowé and penetrate further eastward into the unknown interior. The region they had to traverse was devastated by famine, and they suffered much from hunger and thirst. After crossing the water-parting, they followed the course of a stream which brought them to a great and previously undiscovered river flowing eastward, called the Alima. It was 150 yards in width, and there can be very little doubt that the Alima is a tributary of the Congo. The inhabitants proved to be hostile, a people devoted to war and pillage, and the

explorers were attacked from all the villages they passed, and chased by canoes. Leaving the river they took a northerly course, and crossed several streams flowing to the east, like the Alima. After having crossed the large river Lieona, on the equator, and penetrated to a place called Okanga, some 30 miles further north, M. de Brazza found it necessary to retrace his steps on the 11th of August, 1878, arriving at the Gaboon on November 30th. He describes the region between the rivers Ogowé and Alima as 50 miles across, consisting of hills of moderate height, with many easy passes. The discoveries thus made by M. de Brazza, during three years of toil and danger, certainly comprise the most valuable geographical discoveries that have been made in Africa during the period under review.

While the French have thus opened out a portion of the great unknown tract on its western side, the German traveller Gerhard Rohlfs has set out with the intention of entering it from the north. Accompanied by Dr. Stecker, he started from Tripoli with a caravan of his own camels, and provided with iron water-tanks. His plan is to cross the desert by Sokna, to the oasis of Kufarah, inhabited by the fanatical Senussi, which has never yet been visited. Thence he will continue his journey southwards by Wajanga, a position, entirely unknown, to Wadai, and he hopes to follow the course of the Shari from Lake Chad to its source. The latest news is that Gerhard Rohlfs and Dr. Stecker had reached the oasis of Sokna, and continued their journey on the 11th of March. Dr. Stecker has sent home a topographical survey of the group of oases in $28^{\circ} 57' N.$, called the Djofra, including Sokna, Hon, and Udan.

The Baptist Mission on the west coast of Africa has also advanced geographical knowledge. The Rev. T. J. Comber has recently given us an interesting account of his ascent of the isolated volcanic mass of the Cameroons, of his journeys round its base, through a country covered with magnificent forest, and of his discovery of the beautiful and fertile valley of Bakundu. Here he came upon a lovely lake with an island in the centre, inhabited by kindly hospitable people. He circumnavigated the lake of Balombi-ba-Kotta (named by him Lake Rickards), which he found to be oval in shape, having a circuit of 6 miles, with steep wooded banks all round. Mr. Comber also ascended the River Congo last June to Mussuea, a point above Boma. Here he left his boat and travelled overland for 100 miles, to San Salvador, the old capital of Congo, which he reached in eight days. He says that the country is well described by Lieutenant Grandy; but he succeeded in reaching Tungwa, the capital of Makuta, which Grandy had not been allowed to enter, by a good road from San Salvador. He found it to be a beautiful town, tastefully laid out and planted, with a river flowing round two sides—a tributary of the Quiloa. Tungwa is a great centre of the ivory trade. Mr. Comber left England again on the 26th of April,

with the object of opening up the Congo by steam navigation. He will proceed from the foot of the falls to Makuta, and then strike across to the "Stanley Pool," above the rapids. Eventually a small steamer will be carried over the ground in sections, and launched on the Congo above the falls. Our Society has supplied Mr. Comber with instruments, and much valuable work may confidently be expected from an explorer who has already done so well.

The accomplished travellers sent out by the German African Society have been steadily and perseveringly at work. Major von Mechow, who undertook the exploration of the Quango and lower course of the Congo, was stopped by an attack of fever last December; but Herr Schütt, who was to explore the interior of West Africa from Loanda, is pushing onwards. He was plundered by the Bangala tribe on the Quango last August, and sent his companion, Herr P. Gierow, back to the Portuguese settlements with his journals. But he himself continued his work in company with the Portuguese merchant, Saturnino, and is believed to be travelling north or north-east beyond Kimbundu. Another German traveller, Dr. Buchner, has also started for the interior, and was last heard of, last February, from Malange, in $9^{\circ} 32'$ S. latitude.

In 1877, the Portuguese Government despatched a carefully organised expedition to explore the unknown country bordering on their African possessions. The travellers separated into two branches at Bihé, in November 1877. The northern division, under Senhores Capello and Ivens, have explored part of the course of the Quango River, and in December 1878 they had reached Cassange. Meanwhile the southern division, led by Major Serpa Pinto, has achieved a great success. Major Pinto has marched across Africa in a south-easterly direction, and has arrived at Pretoria in the Transvaal. He has brought with him all his journals and observations, has made a complete exploration of the Upper Zambesi, and has solved the problem of the Cubango. The River Cubango collects the drainage of a wide extent of the Benguela highlands, but the destination of its waters has hitherto been uncertain. In 1859 it was reached by Mr. Andersson, who navigated the stream for about 100 miles, and found it to be 200 to 300 yards wide; but he did not discover into what river it eventually flowed. In announcing, by telegram, that he has solved the problem, Major Serpa Pinto probably means that he has discovered the Cubango to be, as Baines and Andersson supposed, a branch of the Zambesi.

On the eastern side of Africa, and in the lake region, the exploring work has been mainly done by the Missionary Societies during the past year. The Victoria Nyanza has been taken up by the Church Missionary Society, the Tanganyika by the London Missionary Society, and Nyassa, with its Livingstonia settlement, by the Scottish Free Church Mission Committee, whilst the Universities Mission, under the direction of Bishop Steere of Zanzibar, has done good work on the

Rovuma and in Usambara. Mr. Wilson, of the Church Mission, has been residing at the capital of King Mtesa, on the northern shore of the Victoria Nyanza. He arrived there on January 12th, 1878, and has since made an interesting series of observations with reference to the rise and fall of the level of the lake. During last June and August Mr. Wilson undertook a voyage to examine the western shores from Uganda to Kaggi, and at the latter place he found his colleague, Mr. Mackay, who had pushed on from Unyanyembe. Mr. Mackay had, with great tact and courage, re-established peaceful relations with the king of Ukerewe, the country in which Lieutenant Shergold Smith, R.N., and Mr. O'Neill were killed. He ascertained that their slaughter was not premeditated, but that they fell in attempting to defend their Arab friend, with whom alone the king of Ukerewe had a quarrel. It will be a main object of the mission at Uganda to teach the natives the useful arts. The mission steamboat *Daisy* will navigate the lake; and before long it is hoped that a route will be discovered from the Victoria Nyanza to the coast at Mombas, avoiding the dangerous Masai country.

The London Missionary Society has established a station at Ujiji, on Lake Tanganyika, whence letters have been received down to the 17th of last October. Mr. E. C. Hore, the missionary at Ujiji, has sent home some very interesting information respecting Cameron's Lukuga outlet of the lake. The Arabs report that the grass in the Lukuga, which stopped Cameron's progress, was clean swept away in the last rainy season, by the rising of the lake waters. It is now stated to be an out-flowing river, and one of the Arabs had been down it to Lake Kamalondo. Dr. Mullens, whose work in Madagascar proved him to be an admirable explorer, left England on the 24th of April, on his way to Ujiji. He has been supplied with instruments by our Society, and intends, if his other duties permit, to explore the country between the Tanganyika and Nyassa.

From Livingstonia the Scottish Mission continues to do useful geographical work in the region of Lake Nyassa. The second circumnavigation of the lake by Dr. James Stewart, in the steamer *Ilala*, took place in the autumn of 1877, and does not come within the year under discussion; but the progress of the mission is steady, whilst it is satisfactory to know that, excepting one broken link of 70 miles at the Murchison Falls on the Shiré, there is a continuous chain of steam communication from the northern end of Lake Nyassa to the Indian Ocean, and to England.

The interest which has been taken in African exploration by the King of the Belgians will certainly bear fruit, for His Majesty has not been discouraged by the lamented deaths of the first explorers who were sent out under his auspices, and his enlightened and intelligent perseverance is sure to be rewarded by final success. Early in 1878 the sad news arrived of the deaths of Captain Crespel and Dr. Maes, the first

Belgian explorers, of fever, at Zanzibar. Lieutenant Wauthier, a devoted and zealous officer, took up their work, but he also died on the 19th of last December, at Hekungu, near Lake Chaia, and about 80 miles south-east of Tabora. Still the undertaking has not been set aside, and, having been efficiently reorganised, the Belgian Expedition is again ready for work, under the guidance of Mr. Stanley.

The Committee of our African Exploration Fund has organised an expedition, the command of which has been entrusted to Mr. A. Keith Johnston. A man more admirably fitted for the work could not have been selected. He is an enthusiastic geographer, a good observer, and his experience in Paraguay during 1874-75 had initiated him into all the expedients and shifts of a traveller in a wild country. His instructions are to land at the harbour of Dar-es-Salaam, south of Zanzibar, and thence to penetrate to the northern end of Lake Nyassa; and he is to examine the range of mountains seen by Young and Elton to the north-east of the lake. Mr. Keith Johnston has been supplied with instruments by our Society, and the cost of the expedition is defrayed by the African Exploration Fund. He arrived at Zanzibar on the 5th of January, and has secured the services of Chuma, the faithful servant of Dr. Livingstone. In March he made a preliminary excursion to the Usambara Mountains with Chuma, the results of which he has communicated to the Society in an excellent report, accompanied by a map. April is the proper season for commencing his journey into the interior, and by this time he is doubtless on his way, with every prospect of doing good work and securing valuable results.

Turning from the African Continent to the Eastern Archipelago and Australasia, we find useful geographical work progressing. Through the initiative of the Dutch Geographical Society, under the guidance of its learned president, Professor Veth, of Leyden, some important exploring work is now being done in the island of Sumatra. The main object of the expedition was to discover and lay down the course of the River Jambi, and to investigate the question of a possible communication between the highlands of Padang and the east coast of the island, by using that river, as well as to explore some adjacent valleys. By this means a large blank space on the map of Sumatra will be filled in. The command of the expedition was given to Lieutenant Schouw Santvoort, of the Netherlands Royal Navy. The death of the gallant leader has since been announced, but the exploring work has been, to a great extent, successfully done, and the results will, before long, be recorded in our 'Proceedings.'

The missionaries are bestirring themselves in this quarter also. Mr. Chalmers founded a missionary station at South Cape, in New Guinea, about a year and a half ago, and has since made a journey in the south-eastern part of the great island, traversing a previously unexplored country, and increasing our knowledge of the much-indented coast-line.

We expect to receive fuller details respecting Mr. Chalmers' work during the present session; and there seems every reason to expect that the thorough examination of New Guinea will be continued, though slowly, yet steadily, and year by year. In Australia, Mr. Alexander Forrest is employed to examine the unknown country between the De Grey and Victoria rivers; while Mr. H. Vere Barclay has commenced a series of explorations between Alice Springs, on the overland telegraph line, and the eastern boundary of South Australia, a tract of country which was previously quite unknown.

Although a vast quantity of most important surveying work has been done, of late years, in the United States, the need of more efficient departmental organisation has long been felt. A Committee appointed by the National Academy of Sciences has recently reported upon the whole subject. There have hitherto been no fewer than four distinct departments, namely, the coast and geodetic survey, the war department surveys west of the 100th meridian, the topographical work under the interior department, and the surveys under the land office. Between these departments no concert of any kind exists. The committee have very properly come to the conclusion that the coast and geodetic survey is the best adapted to take charge of a department in which all these separate sections of work shall be united. Its duties will thus be considerably extended, and will include a rigid geodetic survey, a topographical survey, surveys for parcelling public land, and rapid reconnaissances, such as are now carried on by the war department. It is also recommended that there shall be a distinct geological survey, presided over by a Director appointed by the President. The advantage of thus consolidating the surveys, and providing for their execution on one system and under one head, is sufficiently obvious; and a very great improvement may confidently be expected, both as regards accuracy in execution and the rate of progress. In the interests of geography, it must be hoped that the recommendations of the Academy will be adopted by Congress.

Some geographical work has been achieved in South America during the year under review. Commander Selfridge, of the United States Navy, who is well known as the explorer of routes on the Darien Isthmus, has executed a track survey of the Lower Amazons, and the lower course of the Madeira, between last June and September. The first part of this undertaking was a work of supererogation; for the Brazilian Government had already executed a good survey of the Lower Amazons, for a distance of 1800 miles, under the direction of Captain José da Costa Azevedo. But the chart of the Madeira, from its mouth to the first falls, a distance of 578 miles, which has been prepared from his surveys by Commander Selfridge, represents new and useful work.

In Guiana, the journeys performed by Dr. Crevaux across the Tumuc-humac Range have added considerably to our knowledge. After cross-

ing the range on his first journey, he descended the Jary River, and reached the Amazons in a march of 142 days. He thus has been the first to cross the Tumuc-humac Mountains, and has discovered the true delineation of the River Jary, an important tributary of the Lower Amazons. Of the results of his second journey the full reports have not yet been received. Englishmen have also been at work on South American exploration during the year. Mr. Simons has undertaken a journey into the Sierra Nevada de Santa Martha, and Mr. Whitely is about to attempt an examination of Mount Roraima and its neighbourhood, in the interior of Guiana.

By far the largest unknown areas on the earth's surface lie round the poles; and while the Antarctic region is probably inaccessible, that around the northern pole must eventually yield up its secrets to the scientific ability and heroic resolution of explorers. The task is a very hard one, but it fires the ambition of the most ardent among the geographers of all maritime nations, and it will be achieved bit by bit. The English Expedition contributed largely to the final result, by completing our knowledge of the portion accessible by the Smith Sound route, and advancing 35 miles nearer to the pole. Next the gallant Swedes took up the gauntlet, and resolved to make the North-East Passage, an achievement which had been fruitlessly attempted during three centuries. Professor Nordenskiöld, the leader of the expedition, prepared himself for success by careful study, and by two preliminary voyages, in 1875 and in 1876. Hence, when he sailed with the well-equipped steamer *Vega*, on the 4th of last July, he knew how to go about his work, and he had made success, humanly speaking, almost certain. He had learnt the right season for pushing forward, and had mastered the motions of the ice. On the 1st of August, when he steamed into the Kara Sea, that once formidable obstacle was quite free of ice. On the 5th the expedition was safely anchored in Dickson's Haven, at the mouth of the Yenisei. Then the time of discovery commenced. On the 19th of August, the first keel made by human hands cleft the sea round the most northern point of the Old World. The *Vega* rounded Cape Chelyuskin, which was found to be in $77^{\circ} 41' N$. On the 27th the expedition arrived off the mouth of the Lena; and, with a favourable wind and a sea free of ice, the *Vega* continued on her wonderfully successful voyage. The Swedish explorers have since passed a winter on the frozen unknown sea, the ship becoming fixed in the ice at Cape Serdze-Kamen (north-west of East Cape) on the 25th of September, but there is no reason to feel any anxiety for their safety, and we shall probably receive the joyful news of their arrival in the Pacific during the course of the summer. But happen what may, and even if their ship is lost, still they have been the first to round the *Promontorium Tabin* of Pliny, the most northern point of the Old World, and have thus achieved a great and memorable success.

The Dutch nation has also embarked upon the glorious work of Arctic discovery, and like the Swedes they are likely to command success through steady perseverance. They wisely determined to begin on a small scale, and that their first expedition should be a summer cruise of reconnaissance. The *Willem Barents*, a sailing schooner of 79 tons, left Ymuyden on the 6th of last May, under the command of Lieutenant A. de Bruyne, of the Netherlands Royal Navy, with Lieutenant L. R. Koolemans Beynen, who had served in two voyages with Sir Allen Young, as second in command. His instructions were to proceed first to Jan Mayen Island, then to determine the edge of the west ice, and of the ice to the north of Spitzbergen, and finally to examine the ice in the Barents Sea. The little vessel returned to Amsterdam on the 13th of October, after a very successful cruise, and having carried out the programme contemplated in her instructions. The Dutch explorers had acquired additional knowledge of the ice movements between Spitzbergen and Novaya Zemlya, had made valuable collections in natural history, and taken a complete series of observations. The voyage was tentative. It was a reconnaissance, and was intended to be preparatory to a second and a third effort. The *Willem Barents* will again sail early next June, and it is this steadfastness of purpose which promises so well for Holland in her northern enterprise.

Before another Arctic expedition of discovery on a suitable scale is undertaken, it is necessary that several very careful reconnoitring voyages should be made, with a view to acquiring a fuller and more accurate knowledge of the ice movements in the Barents Sea than we now possess. Hence the value of these Dutch voyages. Hence, also, the importance of the investigation which Captain Markham hopes to make, during the coming season, along the pack edge. In order to penetrate once more into the unknown region of the pole, it is necessary to reach a coast-line trending northwards, with a western aspect. This is found on the western side of Franz-Josef Land, and the object of a future expedition should be to reach the southern point of that land. It is to this achievement that the efforts of Arctic geographers should now be turned, and detailed examinations of the ice in the Barents Sea are the first essential steps towards it.

Next to the grand northward advance into the unknown area, the most interesting geographical work connected with the Arctic Regions is the exploration of the marvellous interior glacier of Greenland. A very gallant attempt was made to cross this inland ice last summer, by Lieutenant Jensen. This year Lieutenants Jensen and Hammer, both of the Danish Navy, have set out for Greenland on another exploring expedition; and Lieutenant Hammer will remain during the ensuing winter, to examine the great Jacobshavn ice-fiord.

Though there is a pause in the Arctic enterprise of this country, yet some work is being done by the naval surveying service. The *Sylvia*,

under the direction of Commander Pelham Aldrich, is executing surveys on the western coast of Japan; and the *Maggie* has been employed surveying the Wên-chow River, in China, and is now in the Gulf of Tong-King. The *Fawn*, surveying vessel, under Commander Wharton, has visited and determined the positions of the Cosmoledo group and other islands to the north-west of Madagascar, and has since been transferred, at the request of Admiral Hornby, to the unsurveyed waters of the Sea of Marmara. Lieutenant Moore, in the *Alacrity* schooner, has also done excellent work on the coasts of the Fiji Islands. Last August the *Alert* was commissioned by Sir George Nares, and proceeded on scientific and surveying duties to the Straits of Magellan. Her first work is to complete the triangulation of the Straits from Cape Froward to Cape Pillar, and to explore the channels which are supposed to exist between the western side of Wellington Island and some outlying islands, as a protected route for commerce. Her last work has been the survey of the Trinidad Channel, leading into the Pacific. She will next proceed to execute several isolated but important surveys in the South Pacific, and will finally complete the soundings on the south-western coast of Australia. Although Sir George Nares has since accepted an appointment in the Board of Trade, yet his surveying officers, Lieut. the Hon. F. C. Vereker and Navigating Lieut. Petley, are well trained and very capable surveyors, and there can be no doubt that the *Alert* will perform much valuable geographical work during her interesting cruise. The detailed report on the surveys, by the Hydrographer, will be found in the present number of the 'Proceedings.'

The war in Zulu-Land has called attention to the unsurveyed state of parts of the coasts of South Africa, for although the coast-line is correctly delineated, yet the absence of soundings renders the approach very dangerous. In the early part of the year, H.M.S. *Active* and *Tenedos* were in great danger, through having grounded on some unknown reefs between the Tugela River and Point Durnford. It is to be hoped that the Admiralty, after this warning, may be induced to send out a properly equipped surveying vessel to execute sorely needed work, both on the east and west coasts of Africa (northwards from Bashee River on one side, and St. Helena Bay on the other), which have not been sounded since the days of Captain Owen, half a century ago.

If we turn from the active labours of explorers and surveyors in the field, to the efforts of our Society to utilise and disseminate their results, there is equal reason for satisfaction. Very considerable and important accessions have been made to our Library and Map Room, and our 'Proceedings,' in their new form, under the able editorship of our Assistant-Secretary, represent a vast improvement in the Society's publications. At no time since its foundation has the Society been in a more flourishing state, as regards the effective usefulness of its operations; and although our numbers appear to have nearly reached their

maximum, there is every reason for confidence in the increasing importance and value of our operations with a view to the advancement of geographical science. The year which we have now passed in review has been one of steady and useful progress, alike as regards geographical exploration and discovery, and with reference to the utilisation of results through the machinery of our Society. It has been a year upon the outcome of which geographers may look with feelings of unmixed satisfaction.

OBITUARY FOR THE YEAR 1878-9.

THE death-roll of the Society is unusually heavy for the past year, our losses under this head since the last anniversary having been no less than eighty. The more frequent and regular publication of the Society's 'Proceedings' established at the commencement of the present year, has enabled us to give the usual obituary notices in many cases at once, without waiting for the Annual Presidential Address, in which they were formerly published in a collected form. In this way have been recorded the chief points in the careers of Sir George Back, Dr. Petermann, Don Manuel Pardo, Sir W. H. Hall, M. N. de Khanikoff, Mr. E. C. Taintor, Mr. W. O. Hirst, Captain Roe, and Sir Walter Trevelyan. In the present summary it will be needless to do more than refer to these notices; but our losses during the year comprise several prominent geographers and travellers, and many members eminent in other walks of life, whose deaths we have not yet had an opportunity to record; it is necessary, therefore, to notice them in this place.

The first on our list is Commander G. C. MUSTERS, whose remarkable journey through Patagonia nine years ago attracted so much attention. His death, at the early age of 38, occurred in January last. A separate notice of this eminent traveller is given at p. 397. Another of our most esteemed and most useful members, Captain FELIX JONES, of the late Indian Navy, died on the 3rd of September. His biography was given in the 'Geographical Magazine' for October 1878, p. 264. Nearly the whole of his long professional life was spent in Mesopotamia, where he filled various diplomatic appointments, and availed himself to the full of his excellent opportunities for surveying the country, a labour for which his training, as well as his admirable skill and taste as a draughtsman, well fitted him. The last years of his life, after his retirement from active service, were occupied in drawing a detailed map of Mesopotamia, his services for this purpose having been secured by the Secretary of State for India in 1872, the Directors of the Crystal Palace liberally placing an apartment in their edifice at his disposal for his work. He lived to finish the map, which remains in MS., a monument to his skill and industry. The map consists of 4 sheets, 25 inches by 39, and is on the scale of 1:930,000. He died at his residence, Fernside, in Upper Norwood, on the 3rd of September last.—Another eminent member deceased during the year is Captain EDWIN A. PORCHER, joint author with Captain R. Murdoch Smith, R.E., of that magnificent volume, the 'History of the Recent Discoveries at Cyrene,' he having with his friend devoted the years 1860-1 to a voluntary exploration of the topography and ruins of the ancient Greek colonial city. Captain Porcher died on the 13th of last August, at the age of fifty-three.

The other members lost to us by death during the year are as follows:—Sir H. L. ANDERSON, K.C.S.I., a distinguished member of the Indian Civil Service, and Secretary to the India Board in the Judicial, Public, and Sanitary Department; Colonel Sir FREDK. ARTHUR, Bart.; Colonel H. F. AINSLIE (formerly of the 83rd Regt.); Mr. W. J. ADAMS; Mr. J. W. PLOOS VAN AMSTEL; Dr. ANDREW BUCHANAN;

General R. S. BAYNES; Mr. G. P. BIDDER, C.E., the eminent arithmetician and engineer, who had astonished the public as a boy by his marvellous aptitude in calculating; Mr. W. BEST; Mr. W. BLACKMORE; Mr. BLACKETT BOTCHERBY; Mr. H. W. BIRCH; Mr. J. A. BRAND; Rev. D. CHARLES; Capt. C. G. CONSTABLE, I.N., of the Persian Gulf Survey, a further notice of whom will appear in a future number of the 'Proceedings'; Rev. W. G. CLARK, M.A.; Rev. W. B. CLARKE, F.R.S., a *savant* versed in several departments of science, but known chiefly as a geologist. He was born at East Bergholt, in Sussex, in 1798, and, whilst officiating as curate in various parishes in his native county, cultivated geology with great ardour and success, a science which he had first studied under Professor Sedgwick at Cambridge. His chief work, however, was done in Australia, which he visited originally on account of his health in 1839. He was Vice-President of the Royal Society of New South Wales and trustee of the Australian Museum. In his early days he cultivated also the *belles lettres* with distinction, his poem on Pompeii, in competition for the chancellor's gold medal at Cambridge in 1819, being considered as second only to that of the prizeman's, T. B. Macaulay. His best-known work is 'The Southern Gold-fields.' He died on the 16th of June, 1878.—Mr. S. S. COWPER; Mr. B. COLLS; Rev. ARCHER CLIVE, Whitfield, Herefordshire, widely known and respected in his county, where he owned a large landed estate, for his high personal qualities. His wife was Mrs. Archer Clive, the authoress, whose accidental death by fire some years ago caused much public regret at the time.—Mr. S. M. DRACH, who achieved some reputation in special circles as a mathematician, and was a constant frequenter of the Society's reading-room and meetings; Lieut.-Col. JNO. DIXON; Mr. S. S. DICKINSON; Mr. J. C. DIMSDALE; Colonel JAS. DAVIDSON; Mr. R. S. FAULCONER; Mr. H. E. EATON; Mr. J. T. EDMONDS; Mr. GEORGE FRERE, of the Foreign Office, who served for some time as Slave Commissioner at the Cape of Good Hope; Mr. W. S. FITZWILLIAM; Sir RICHARD J. GRIFFITH, Bart., who was formerly Professor of Geology in Dublin, and the author of the well-known Geological Map of Ireland. He was employed in 1824 in the boundary survey of Ireland, preparatory to the Ordnance survey; he was 94 years old when he died on the 25th of last September. During his long career he was employed in most of the works of public improvement in Ireland, such as the River Shannon navigation.—Major-Gen. W. W. H. GREATHED; Mr. LOTON HOLLAND; Capt. H. G. HAMILTON, R.N., a Fellow since the foundation, and the son of one of our Presidents, and brother of another; Baron HEATH, the last-surviving schoolfellow of Byron at Harrow, who died the 16th of January last at the age of 81. For many years he had discharged the duties of Italian Consul-General in this country. He was a Fellow of the Society of Antiquaries.—Colonel R. HOME, R.E., who commanded the Engineers in the Ashantee war, and whose great administrative ability was subsequently employed in the re-organisation of the army and in high missions of State connected with recent political complications. His death, caused by his exertions as English Chief Commissioner for the delimitation of Roumania, at the early age of 41, is regretted by all who knew his worth as a national loss.—Mr. J. HARVEY, of Ickwellbury, well known as a yachtsman, who in his yacht, the *Claymore*, had visited most parts of the world. When at Tyre he was instrumental in saving the town and the lives of all the Christian inhabitants during the war in Syria, for which gallant deed he received the thanks of the Government and both Houses of Parliament.—Mr. R. JONES; Captain GRIFFITH JENKINS, of the late Indian Navy; Mr. J. KNIGHT; Mr. H. S. KING, the head of the firm of East India agents and bankers, of Cornhill; Mr. J. H. LANCE; Mr. THOS. LOVELL, C.E.; Mr. WM. MACAULAY; Sir JAMES MATHESON, Bart., F.R.S.; Mr. R. R. MAYNARD; Mr. C. D. MACKINNON; Captain R. R. PATTERSON, whose death in South Africa, as it is supposed, by the treachery of King Lobengule, is men-

tioned by Sir H. Barkly in these 'Proceedings,' p. 244; the Society thus losing a valuable member and a traveller of great promise.—Mr. J. PRYCE JONES; Mr. C. C. PLOWDEN; Mr. W. PERRY; Mr. J. PAUL; Earl RUSSELL, the eminent statesman, who had been a Fellow of the Society since the year of its foundation, and took great interest, whilst a member of the Government, in the explorations of Dr. Livingstone.—Captain E. WYNNE ROBERTS; Mr. J. T. ROBINSON; Mr. L. R. REID; Mr. H. VON RÖNN; Mr. T. STEVENSON; Mr. JAS. MUDIE SPENCE, a traveller in Venezuela, and the author of a work on that country entitled 'The Land of Bolivar'; Mr. C. TEEDE; Mr. GEO. T. TOMLIN; Mr. J. G. TAYLOR; General JAS. WEBBER SMITH; Mr. W. R. WARD; Mr. E. H. L. WILLOMS; Sir F. M. WILLIAMS, Bart.; Mr. A. WHITE; Rev. J. W. WORTHINGTON, D.D.; Sir W. YARDLEY.

ADMIRALTY SURVEYS FOR THE YEAR 1878-79.*

THE examination and charting of the seaboard in various parts of the globe, in aid of navigation and commerce, are making steady progress, and have received important additions for their more effective performance during the past year. One highly efficient ship of war, *Alert*, has been added to the surveying branch of the Navy, and a second ship of war, which from long service was failing in efficiency (*Nassau*), has been replaced in China by H.M.S. *Maggie*. A steam vessel of good size and power has also been hired in Australia. This brings the surveying squadron for foreign service up to six steamships (two hired), and four sailing schooners (one hired): for home service, two steam vessels (one hired): employing in all 75 officers (commission and warrant) and 620 men.

On our own shores, since the last Address, H.M.S. *Porcupine* and the hired steam vessel *Knight Errant*, under Staff-Captain Parsons and Staff-Commander Stanley, with an efficient staff of assistants, have, in the interests of modern navigation, continued the accurate sounding out of the deep-water areas in the English and Bristol Channels, in the first between the Owers and Portland Bill, and in the second between Milford Haven and the Scilly Islands. Among the coast details which have received especial examination is the Cackle channel off Yarmouth, as to its availability for the heaviest draught war-ships in the event of the Fleet having to rendezvous in Yarmouth roads, the sands of this neighbourhood undergoing constant change. And to meet the demands of inshore steam navigation, the Needles channel, with its rocky bridge; the approaches to Poole harbour; the shores of St. Bride's Bay, and those between St. David's Head and New Quay.

On Foreign Stations.—H.M.S. *Alert*, under the command of Sir George Nares, quitted England in September last, and reached the scene of her first year's labours—Magellan Strait and the adjacent waters—early in January; and to the latest dates was actively working in Trinidad channel on the 50th parallel of S. latitude, and in the examination of the ship passages between that locality and Puerto Bueno, in Sarmiento channel. On the outward passage several ocean depths were obtained in the neighbourhood of the Hotspur and Victoria banks, and a few soundings taken over them. These singular isolated shoal banks, lying between the parallels of 18° and 21° S., and distant 50 to 60 leagues from the South American continent, average in their depths from 25 to 30 and 35 fathoms, and so far as explored are composed of dead coral, worn down to a level surface, and smoothed with a very thin incrustation of fine *polysa*. The observations of Sir George Nares lead him to infer that these banks were once reefs of living coral with shallow water over them, which have subsided to their present depth; but that the subsidence was too rapid for the reef-building coral animals to keep pace therewith, and the banks are now at too great a depth for the coral to exist.

* By the Hydrographer, Captain F. J. O. EVANS, R.N., C.B., F.R.S.

H.M.S. *Fawn*, Commander Wharton, on leaving the Cape of Good Hope in June, 1878, after recruiting the health of her ship's company, visited the little-frequented islands lying to the north and north-west of Madagascar; charting and definitely determining the positions of Farquhar Island, the Cosmoledo group, Assumption and Aldabra Islands. These surveys, with an examination of the dangerous Basses da India reef in the Mozambique channel, and an unsuccessful search for the Pilot shoal reported near thereto, together with a running survey of the east and north sides of Comoro Island, form a valuable contribution to the hydrography of these seas.

Resuming the survey of the coast north of Zanzibar, some progress had been made towards Mombaza, including Pemba Island, when the exigences of the service required the transfer of the *Fawn* to the Mediterranean. The ship reached the Sea of Marmara in December, and a survey of its shores commenced. The group of islands to the south of Marmara Island with their several anchorages were completed, under difficulties from the inclement weather, by the end of January. After a necessary refit at Malta, the *Fawn* has now commenced operations in the Gulf of Ismid.

Among the miscellaneous hydrographic information obtained by the officers of Her Majesty's Fleet serving in the Mediterranean during the present year, has been an elaborate survey of the anchorages and ancient port of Famagousta in the island of Cyprus carried out by Staff-Commander Millard. The capabilities of this locality for the formation of an extensive and secure deep-water harbour, by the utilisation of a submarine reef, which here skirts the shore, has formed the subject of interesting professional reports, presented to Parliament during the present session.

H.M.S. *Nassau*, under Captain R. H. Napier, has been employed on the seaboard of China, between Hong Kong and Shanghai, perfecting the inshore navigation by sounding and searching for reported dangers in various localities: much good work has been effected in this field. An exhaustive survey of the Wên-chow River as far as the town of Wên-chow (a treaty port), together with the seaward approaches, has been completed, as also the neighbouring San-pwan Pass; useful additions have further been made to the existing charts of Hong Kong. By the latest accounts the *Maypie* has proceeded to the little-known district of Hainan, mainly for the examination of Hainan Strait, and of the new treaty ports of Hoi-how and Pak-hoi.

H.M.S. *Sylvia*, under Commander Aldrich, is steadily working on the western shores of Japan. The past year has seen the Goto Islands group very nearly completed, and the positions of the off-lying obstructions to their south-west—the Pallas Recks and Meac Sima, or the Asses' ears—accurately charted; as also the coast of Kiusiu, between Noma Saki and Cape Chichakoff, triangulated, preparatory to the details being filled up, and the survey of Vau Diemen Strait commenced.

The Japanese Hydrographic department is performing much useful service, and it is understood that a survey of the east coast of Kiusiu, including the entrance to the Boungo Channel, will be shortly undertaken by it. The completion of the shores of Kiusiu may thus be expected at no distant date.

In Newfoundland, Staff-Commander Maxwell, with two Naval assistants, in the hired steam vessel *Gulnare*, have completed Placentia Bay, after a laborious examination of its many rocks and dangers. The survey of the shores of Notre Dame Bay is also making good progress in the interests of the valuable mines, chiefly copper, now being opened up in that region, and the consequent increase of shipping.

The survey of the shores of Jamaica and its marginal bank of soundings, is being successfully prosecuted by Lieutenant Pullen and two Naval assistants in H.M. schooner *Sparrowhawk*. The western part of this island, from Savannah la Mar, on the south, to Falmouth harbour on the north, with enlarged plans of the intermediate ports, has been completed in the past year.

In Australia, the shores of the province of Victoria and its adjacent waters are now completed, and the Admiralty surveying party, under Staff-Commander H. J.

Stanley, withdrawn. Queensland and Western Australia, from their great extent of coast-line and adjacent reef features, will yet require years of patient labour. The coasts of South Australia are rapidly approaching completion, probably in 1880 or 1881. Staff-Commander Howard is now working on the mainland in the neighbourhood of Nyts Archipelago and Fowler Bay.

In Western Australia, the coast from the 28th parallel of S. latitude to Cape Leeuwin, and thence eastward to 118° 40' E. longitude, has been closely examined and charted. Plans of Champion and Jurien bays, the approaches to and anchorages in the neighbourhood of Swan River and Cockburn Sound; anchorages in Géographe, Hamelin, and Flinders bays, together with King George Sound and its inner waters, are also completed—an excellent outcome of hard work for the six years Staff-Commander Archdeacon and a Naval assistant, with limited nautical resources, have been employed in the survey. During the past year the commercial interests of this colony required the despatch of a vessel to examine the detached reefs and sand islets, distant in some cases 60 leagues from the north-west shores of Australia. Navigating Lieutenant Tooker of the Admiralty Survey was attached to this Expedition, and performed good service in defining the limits of and determining in position the Imperieuse, Ritchie, Mermaid, Clarke, Scott, Seringapatam, Ashmore, and Hibernia reefs. Browse, Adele, and the Laepede Islands were also visited, and the sites of various reported dangers sounded over. The area traversed was comprised between the parallels of 21° S. and 12° S., and the meridians of 115° and 126° E. longitude.

The Queensland Coast survey, under Staff-Commander Bedwell, is now being pressed forward in a hired steam vessel. The work has been taken up from Cape Palmerston and completed as far north as Flat-top Island in latitude 21° 10' S. The several channels extending from this line of coast to the Percy Islands are completed, numerous shoals not previously known having been found. The survey of the River Mary on a large scale has also been completed to the town of Maryborough.

Lieutenant Moore, in H.M. sailing schooner *Alacrity*, is with praiseworthy assiduity following up the examination of the Fiji Islands. The triangulation of the Lau or Eastern group comprised between 17° and 19° S. and 179½°–178° W. longitude, is completed, and the details of the numerous islets and encircling reefs in this area, as far south as the Oncata passage, charted. Lieutenant G. E. Richards, in H.M. sailing schooner *Renard*, now acting under the orders of the Commodore of the Australian Station, has effected a thorough survey of the Indispensable Reef, south of the Solomon Islands, hitherto a great obstruction to secure navigation. He has also added to our knowledge of the Bampton Reefs, tracing their extension to the north-east and east, far beyond the old charted limits. The useful surveying work performed among dangerous reefs, in these two small sailing vessels, deserves warm commendation.

This retrospect of the year cannot be closed without reference to the recent decease of Admiral George Bedford, one of our oldest surveying leaders. The Admiral closed his long professional labours as an esteemed member of the Board of Trade. The Government has selected Captain Sir George Nares—well known as the chief of the late *Challenger* and Arctic Expeditions—in command of the *Alert*, as a worthy successor; Captain Maclear, formerly the second in command of the *Challenger*, succeeding Sir George Nares.

The year's labours of the Hydrographic Department include 185 Notices to Mariners, 46 Hydrographic Notices, in 360 pages of octavo; revised editions of sailing directions for the south-west and north-west coasts of Ireland (Ireland, Part II.); and also for the Bristol Channel; the Africa Pilot, Part III., embracing the south and east coasts of Africa from Cape of Good Hope to Cape Gardafui and the

islands in the Mozambique channel; China Sea Directory, vol. ii., comprising directions for the navigation of the China Sea between Singapore and Hong Keng; and also sailing directions for the west coast of Sumatra, in pamphlet form; a revised edition of the Wind and Current charts for the three great oceans has also been published; and the usual revised lists of Lights for the World, now expanded to ten large pamphlets.

Many useful additions to hydrography are being received from the officers of Her Majesty's Fleet, and by their vigilance the necessary rectification of the Admiralty charts and sailing directions can be promptly made. Among the officers of the mercantile marine also aiding in the interests of hydrography, thanks are due to Mr. E. M. Edmond, R.N.R., commanding Peninsular and Oriental Company's steamships in China and Japan.

The new charts and plans published, amount this year to sixty-one, and 1950 charts have been corrected; 202,800 charts have been printed for Her Majesty's service and for the use of the general public.

*The Mardian Hills and the Lower Indravati in the Bustar
Dependency.* By Captain T. H. HOLDICH, R.E.

Map, p. 416.

By following up the Godavari River from its mouth at Masulipatam, on the eastern coast of India, and passing first through the wide alluvial plains of its delta, and then beneath the frowning, forest-clad hills that enclose it at the "gorge," where the river breaks through the great chain of the Eastern Ghats,—onward, some 120 miles in all, from the coast, the traveller will arrive at the unimportant little out-of-the-way station called Dumagudiam.

Dumagudiam owes its existence to the great scheme of the Godavari navigation, that was to open up the trade of the Central Provinces and bring it into direct communication with the coast at all seasons of the year. The scheme has long since been abandoned, but Dumagudiam remains, a convenient dépôt for many old fragments of the navigation works, and a fine frontier post for missionary enterprise. Between Dumagudiam and Sironcha, the most southerly frontier station of the Central Provinces Commission, is a fairly good highroad along the river banks for another 120 miles or so, along which are scattered many sad monuments of a great project abandoned for want of funds; standing records of energy and skill vainly expended in overcoming great natural obstacles, witnessing against the stern policy which has abandoned them to decay. From Dumagudiam the traveller may strike off northwards into the uninviting country spread before him, or from Sironcha he may follow a tolerably good route due east into the same country; in either case he will soon find himself in a district which, for its unutterable wildness, and its very extremity of poverty, has, I believe, no parallel in India. These are the low-lying westerly taluks of the dependency of Bustar, a state which has enjoyed for centuries the privilege of being one into which no visitor has ever entered for pleasure or profit, notorious for its extreme unhealthiness, its

trackless jungles, and for a wilderness of mountains never explored by Europeans before the Survey passed over them two years ago, but which hide within them the secret fastnesses of one of the aboriginal Turanian races of India. They form the last cover, as it were, left by the relentless advance of higher civilised powers, to shelter a race of people that are without a history: who preserve customs, and erect monuments which have usually been looked on as pre-historic; who are sunk to the very uttermost in poverty, but yet preserve much manliness and dignity, and apart from their well-founded fear of strangers, are pleasant and agreeable to deal with. There is much that is interesting in this land, but nothing that can lead an enthusiast to hope great things for its future.

The elevated tract of country which is known as the great Jcypore plateau includes in its western edge some part of the Bustar dependency. This plateau may be said roughly to break upon the line $81^{\circ} 30'$ E. long., and it is across this line that the principal tracks form ghats or passes from the highlands to the lowlands. But this western edge is somewhat indefinite. North of the Indravati the tendency of the mountain masses is to assume a flat-topped form, with steep, scarped sides, as of irregular-shaped bits of plateau broken off from the main mass. This hill formation is known further north in the Central Provinces under the generic name of Pât, and these pâts form great obstacles to the progress of survey operations from their extreme flatness. Those who were with the Abyssinian Expedition will remember the peculiar effect of similar mountain masses formed under identical natural laws, in the landscape of that remarkable country. Immediately to the north of the Indravati this mass of hills trends considerably to the westward, and determines the course of the river. This is the district hitherto vaguely known as Abajmard, or the Mardian Hills, to which I have referred as the last stronghold of the Maria Gonds. South of the Indravati, and more clearly detached from the plateau, there gradually rises, extending north and south, a range of hills called Bailadila, terminating in a grand collection of magnificent granite peaks, one of which, Nandiraj, is 4000 feet above sea-level. South of these peaks we strike the edge of the plateau again, which here juts out to the south-west, and forms one continuous mountain system with the Rampa Hills and the Eastern Ghats. The surface of the Bailadilas is strewn with ironstone and blocks of laterite, which, piled up into confused masses, render the task of making one's way about them difficult and tedious, if not dangerous. The view from the peak of Nandiraj is very grand. On the north are the rugged outlines of the Mardian Hills; to the west the long, regular, square, flat-topped sandstone ridges of the Gadalguta shut out the far distant Godavari from view. South are the lofty and well-wooded hills of the Rampa district, and far away to the east, like a faint morning mist, are traced the higher ranges of the Eastern Ghats, overlooking the plains that skirt the Bengal Sea. And throughout this vast scene there is not one single break in

the endless monotony of forest to signify life and cultivation; only an unending wilderness of grass and jungle, a wide expanse, like a sea, from which not a sound comes up to disturb the oppressive silence.

The Indravati River rises in the highlands of the Kalahandi dependency, and flows west for about 130 miles to the village of Kutru. From this point it follows a north-westerly course for about 45 miles, and, after receiving the waters of two large affluents, the Kotri and the Nibra, near Bhamragarh, takes a sudden bend south-west, and, with a rapid course of 70 miles more, joins the Godavari 30 miles below Sironcha. For the upper part of its course along the plateau it is a navigable river, bordered by a fringe of paddy or rice fields; its flow is monotonous and even, and the scenery tame. But at Chitterkot it falls suddenly 100 feet from a ledge of sandstone into a deep, dark pool below, from which it emerges through a narrow outlet, and rushes through a ravine about 500 yards wide for a distance of several miles. The fall of a great river is always beautiful, and this is the one green spot in the wild wilderness of Bustar. The sides of the ravine are clothed with bright verdure, and the mighty rush of water through the narrow channel at those seasons when the river is in full flood is described as impressively grand. These falls (as in the case of Niagara) are gradually receding eastwards with the wearing action of the water on the sandstone. From the falls to its mouth the river bed is filled with masses of rock, seldom presenting an open surface even for half a mile or so, and forming about 25 miles from its mouth, the Jheetum Rapids, which are an effectual bar to navigation for a great part of the year. Small canoes formed from the trunk of a tree are found useful for ferrying and fishing, but the Indravati is no highway, and these canoes are seldom out of sight of the village ghats. The river offers no evidence of liability to sudden floods such as usually occur under similar conditions of rise in highlands. The banks are usually low, and the villages built down to the water's edge in many places. The monotonous waste of jungle-covered hills through which it flows is relieved by the bright green which marks its course, and clothes the rocky islets in its bed, affording delightful cover to a great variety of large game, which here abounds in security, which, alas! is hardly to be found in the healthier jungles of India.

Herds of buffalo find choice feeding grounds in the rank grass of its clayey banks, and in some of the larger islands of its lower course, occasionally wandering as far south as the Talperu stream, which drains the lowlands of the south-western taluks. Bisou used to be found in numbers on the hills that enclose the Jheetum Rapids. Latterly they have migrated southwards, but may at any time return to a spot which certainly seems to afford them all they could wish for. The chital, or spotted deer, and the marsh deer, abound at many green spots of its course; and the sambhur, or red deer of India, on the rocky hill-sides. Where there are sambhur and the wild boar, there will be tigers, but

they are not to be found near the Indravati in anything like the numbers in which they infest the neighbourhood of the Savri further south.

Such a hunting ground as this would doubtless long ago have been thoroughly explored, now that year after year sees the fields hitherto sacred to the sportsman gradually narrowing, and the actual extinction of many animals (as the Central Indian lion, for instance) in the forests held by them for more centuries than we can tell, but for its deadly climate, which is even more prejudicial to a native constitution foreign to it than to the European.

Two large affluents of the Indravati from the north drain a wide district south of Raipur, similar in most essential respects to that already described. The Papra flows over a bed generally sandy and even, through the district of Ahiri, here and there forming the boundary between Ahiri and Bustar, and draining some valuable forest-land to the westward. Between the Papra and the Kotri, we find again nothing but dense forest and grass, occasional signs of rude cultivation, abandoned many years ago, with evidence of great richness of soil in parts. The Kotri (or Parlakot) and the Nibra drain the Mardian Hills, and carry much water to the Indravati, even in the dry season.

No one who has passed through Bustar, and marked its aspect well, can fail to be struck by its extreme poverty. Adjacent to the banks of the Upper Indravati there is indeed a certain amount of cultivation, and again near Bhopalpatnam, on its banks, near its junction with the Godavari, a few large and thriving villages gladden the eye, and lead to pleasant imaginings of a similar state of things extending further than one may see, possibly into the bleak hills and forests beyond; and, indeed, anyone following the main route from Sironcha to Jugdulpore would arrive at very false impressions of the value of land in the Bustar dependency. Nor is the reason very obscure. Roads, like railways, create their own traffic, and the existence of this one fairly practicable route has led to the settlement of the most industrious classes in its immediate neighbourhood. Beyond such roads, and especially in the regions north of the Indravati, the population is exceedingly scanty, scattered about in small hamlets of two or three mud and wattle huts, which shift and change their sites from year to year. A small amount of Dahi cultivation is maintained by the use of fire and axe, the seed being sown broadcast in the first rains, but the chief maintenance of the people is imported rice of bad quality, which is brought down from the plateau on pack-bullocks.

I believe the population to have been decreasing for some time. There are many evidences of a better state of things in the past, and this decrease is probably due to the wretched misgovernment that prevails at the Court of Jugdulpore, combined with facilities of late years in obtaining employment under British control in the neighbour-

hood of the Godavari, which has led to emigration. Still there are spots where great improvements might be readily effected. For instance, it has been well pointed out by Colonel Glasfurd (one of the Deputy Commissioners of the Central Provinces) that an anicut, or dam, at Chitterkot would render irrigation available for a large part of the Indravati basin, and probably treble the revenue of that part of the dependency. The chief value of the land lies in its timber. Sâl is found in the north-east, and teak in the west and south ; but the utter mismanagement, the wasteful cutting that prevails where water-carriage is to be had, and the want of that carriage through many miles of valuable forest, neutralise to a great extent the value of this source of revenue. Honey, wax, lac, and galls, are perhaps, with hides and horns, the chief exports of the country. A poor list, indeed, from which it is not easy to see where any trade could spring which might lend weight to the proposed scheme of Godavari navigation.

Of the climate, nothing can be said in its favour. The excessive humidity of the atmosphere (which produced effects on surveying instruments which caused much perplexity to surveyors) and the condensation of moisture during the cool night hours of the cold weather, acting on the vast extent of decaying vegetation, render the cold season almost as productive of that poison which we call malaria, for want of a better name, as the rainy season elsewhere. The poison imbibed is often long and slow in giving evidence of its existence, and is all the more to be dreaded on that account.

It may be useful to mention that the best preventives were found in the strict exclusion of night air, the creation of artificial currents and draughts by fires, and the avoidance of early morning work before breakfast. But yet we know, from recent history of other parts of India, that the climate of a district may change most materially with the changes wrought in its physical aspects by the industry of man. Given, a wise and strong Government and an industrious class of settlers, there is nothing in the soil or climate of Bustar absolutely to forbid a happy future of broad cultivated lands, partly to replace the present wilderness; and it may be that this unpromising country may yet be populated and cultivated by a people whom pressure of numbers has driven from the overstocked districts of Upper India.

But the real interest of this region lies neither in its wild rivers and mountains nor in its possible future, so much as in its present inhabitants. Here we can study the customs, and conjecture, if we please, the past history of a Turanian race of people, of whose origin there is no record, who possess no written language, and about whom even modern history is silent previous to the time of the Mahrattas. With a small exception, all the aboriginal tribes of Bustar may be classified as Gonds. The many different tribes or castes are separated from each other by pretty distinct differences in social customs and physical appearance; but

it seems most unsafe to generalise from identity or otherwise of ceremonial customs. It is most difficult, in the first place, to gain anything like accurate knowledge of such customs; for the mass of the people have only vague ideas of the meaning of their own rites, which are elaborated or curtailed just in proportion as those principally concerned are prepared to pay for the performance. Identity of language, however, derived from a comparison of dialects, gives a much safer basis for classification; and, if we accept the word *Gondi* as expressing a language which owns a great variety of dialect, based apparently on Tamil (the language of Madras), we find that, with one single exception, the tribes of this district belong to the great Gond or Dravidian division of the southern aboriginal races.

This one exception is formed by the Gadbas (a small tribe dwelling in the highlands), whose language appears to be connected with that of the Kols, and who must, in spite of their geographical position, be for the present written down as Kolarian. Taking the Mardian Hills as representing the head-quarters or centre of Gondwana, there extend in all directions, but notably to the south and east, tribes of Gonds, whose primitive habits become more and more changed and modified by contact with each other, and the gradual admixture of Hindoos and Mahomedans as they approach the limits of the dependency. Along the borderland their habits, manners, customs, and language are so much borrowed from neighbouring Hindoo castes of higher social status than their own, as to be barely recognisable in their altered form, and they become mixed up with a number of low castes, of some of which (as the Dhers, or cloth-weavers, of the Talpern Valley) it is hard to say whether their origin is Turanian or Aryan—whether they are Gond or Hindoo. So that proceeding from the south we find the Telingàs, a Hindoo race occupying the hill country south of Bustar, right up to the banks of the Savri. North of the Mardian Hills, again, exists another Hindoo race, and in the centre we have the Gonds; the wilderness of Bustar hiding the aborigines “like a piece of cover in an open country,” the last and almost impenetrable refuge of a wild race driven in by the advance of civilisation. Without reference to many subdivisions into tribes, the grounds for which are given in the Ethnological Report of the Committee at Jubbulpore in 1866–67, before the country was explored—we may refer to three principal tribes which, while they are undoubtedly closely connected, still exhibit striking specialities in manners, customs, and appearance. Directly we pass the Savri northwards we strike into the land of the Koi. The Koi (otherwise Koiwar or Koitor) is a small wiry little man, with decidedly Turanian features, dark-skinned, lazy in habits, and physically appearing weak and wanting in muscle. His hair is twisted off his head into a knot behind, he has no hair on his face, and his high treble (and very musical) voice, and fancy for beads and ornaments, which are generally displayed in great profusion round the neck

and arms, give him a peculiarly effeminate appearance. The dress of the men is usually limited to a single cloth round the loins, and a vast quantity of beads round the neck, which represent more or less the wealth and social status of the wearer. The women are better clothed. When the Koi dwells on the borderland he is given to apeing the manners and customs of his Aryan neighbours, and in the vicinity of the Godavari he is known as Koi Dora, or Koi gentleman, a distinction which is somehow often admitted by other contiguous tribes. His gentlemanly instinct is certainly shown by his aversion to hard labour, and he greatly prefers tending his herds of cattle and basking gently in the sun to any pursuit involving fatigue. Further north as we near the Indravati and the great road which has been already referred to, running east from Sironcha to the plateau, we come upon the Gottur or Gottawar. The Gottur is taller, fairer, and physically more powerful than the Koi. In other respects, particularly as to the hairlessness of his face, he is the Koi's twin-brother. Independent of the remarkable similarity of names, the two words Koitor and Gottur being sometimes hardly distinguishable, they have an absurd legend which connects them by tradition. In the beginning it is said that Vishnu created Adibaba and Surangi, and bringing them together united them. At one birth Surangi had 196 children, of which 130 were Kois and 66 Gotturs. She was unable to bring up this astonishing family, which were provided for by their father Adibaba, by being turned loose into the jungles of Bustar. From the land of the Gottur to that of the Maria is but a step further northward across the Indravati. And in the Maria we find the purest and simplest Gond, probably the most perfect type of the family. The Marias of the Mardian Hills are a singularly wild people, so that it is difficult to establish intercourse with them. The approach of a stranger towards their villages, which are usually well hidden away in the dark recesses of the hills, is usually the signal for its complete desertion. Their dread of a horse is so ludicrous, that it is only to be accounted for by the supposition that they rarely, if ever, see one. But when once brought to parley, they have a free and independent bearing, which is not at all displeasing from being so unusual, and they have proved themselves to be active and intelligent, though thoroughly untrustworthy as guides. In personal appearance there is not much to choose between the Maria and his more civilised Gond brethren, the Gottur and the Koi. Many of them are light in colour, and the absence of hair on the face is, curiously enough, not so universal as one would expect to find in the purest type of Gond. Living in the fastnesses of a hill country, they are exposed to great vicissitudes of hardship and cold, and the habit of sleeping between fires for warmth leads to their being frequently covered with the scars of burns, and to a peculiar colouring and texture of skin from being constantly begrimed with cinders. Beads round their necks and brass ornaments

in their ears and round their arms are the usual ornaments, but the rarity of them and the general scantiness of attire testify to the extreme poverty of the country and people. It was currently reported by the people of Bustar living in the neighbourhood of the Mardian Hills, that the Marias of the remotest parts of these hills were an unclothed people; that not only did no cloth or covering exist among them, but that superstition prevented its introduction. Such a state of things indicated a position in the scale of civilisation so low, that nothing analogous to it is to be found in India, and we must look to the wilds of Central Africa for a similar state of society. But I cannot say that experience altogether supports such a statement. There is very little clothing about them, certainly, either men or women, but the extreme care displayed of such an amount of dress as was worn by both sexes showed that they fully appreciated its advantage. There were signs certainly of great antiquity about the drapery of some of the women, who appeared to be even less averse than the men to a full display of a figure that was not always graceful. Beyond a doubt, their customs in this particular are such as to classify them very low indeed in the scale of humanity, and I have reason to think that it is nothing but the presence of a stranger that leads these wild people, sunk in the very lowest depths of poverty, to array themselves even in such scanty attire as they possess. But it is poverty and not superstition that bars the way to the greater development of what is the first civilised instinct of mankind. A leather belt, occasionally ornamented with cowries, is worn by the better classes round the waist, and is capable of being knotted tight to suit the capacity of an empty stomach, and to allay the gnawing pangs of hunger in the days when food is scarce. They are expert shikaries or huntsmen, using the bow and arrow with great dexterity, and their methods of snaring and driving game show great ingenuity. The religious notions of such a people are naturally vague in the extreme. No regular priesthood exists among them, but they have certain faith in the charms and incantations of a class of witch-finders or medicine men. Witchcraft is appealed to as controlling the course of most of the ordinary affairs of life, and until recently this belief in witchcraft led to most horrible cruelties and wrongs. If questioned as to their faith, they reply that they worship Pen, or Pennoo, which is, I understand, the same word expressing Deity that is used by the Khonds far to the north-east of Bustar. The presiding deity of the dependency is, however, called Danteshwari, and there is a small temple in her honour at Jugdulpore. But the real goddess of this vast wilderness is one well known to its people, one who meets them year after year on the same ground and claims their lives with fatal regularity—the great goddess Matadevi, or small-pox. I seldom camped in the neighbourhood of a village without special inquiry on this subject, and seldom indeed was it that a clean bill of health could be returned as regards this terrible

scourge. Needless to say, no Government vaccinators, not even the solitary missionary (usually the pioneer to discovery in such regions as these) has ever penetrated the Bustar jungles. A stone set up by the side of the road and dabbed with red paint, with a few simple offerings before it, or a small miniature swing fashioned out of bamboo, represent the ever-present Matadevi, a goddess whose influence these wild people acknowledge as much for good as for evil, with a simplicity of faith that teaches much of the insecure tenure of their life, and of what its hardships must be to them to make such a visitor welcome to their homes.

Of course it is hard, almost impossible, to eliminate anything like original ideas of their faith from them. Superstition and witchcraft, Hindoo practices and mythology, are all so mixed up in their minds, that it is not possible to say that the Gonds of Bustar have any distinct faith at all. The practice of Meriah or human sacrifice is said to have existed among them. It is impossible to verify the truth of this, and sufficient to say that no trace of such a horrible rite exists now. All these tribes marry early, and the arrangement is made either a matter of barter, or in the case of the very poorest classes a certain sham abduction of the bride takes place. The Marias always bury their women and children and burn the bodies of men. The other tribes either burn or bury according to their means. The body of a deceased Maria is burned at the foot of the Mohwa tree, and generally (not always) is tied in an upright position to the trunk of the tree while this process is carried on. But the most interesting feature of these Turanian races is their custom in the present of erecting those rude stone monuments to the memory of their dead, that are so closely connected with the remotest history of the past. In districts where suitable stone is not procurable (as chiefly among the Kois) wooden monuments are used instead. The Kois and the Gotturs of the plain districts erect posts instead of stone slabs. With the Kois one post, to which the tail of the cow used in sacrifice at the funeral rites of the deceased is nailed, is usually the complete structure. Among the Gotturs two posts are erected, often curiously carved and ornamented, and at the foot of them is often a stone slab laid horizontally, which has served as a rude altar of sacrifice, and now stands for offerings made to the spirit of the departed. In recent monuments of this nature, curious little miniature implements of bamboo are found, and invariably a rough figure of half life size of a peacock, often gaudily arrayed in coloured cloths to represent its original as closely as possible. But when suitable stone is to be found, as is the case in every hilly district, the monument takes the form of rough gneiss slabs set up on end, sometimes six or eight feet high, but always in rows along the side of a frequented path in the neighbourhood of a village, representing, as I was frequently informed, by their size the age of the person to whose memory they were raised. These seem to be quite peculiar to this part of India. At the foot of these slabs were frequently

small flat stones supported by four little round ones, bearing some resemblance (according to Colonel Glasford) to the Indo-Scythic remains found in the Nizam's territory near Sironcha. There is in one place at least, near Soonkum, a trilithic monument, formed by two uprights with a cross piece, erected to the memory of a good and charitable woman; but this is the only one of its class that I know of in the lowlands of Bustar, though there are others in the hills to the south now peopled by the Telingas. Nor is there, I believe, anywhere east of the Godavari anything at all analogous to the cromlechs and remarkable stone crosses found at Mangapet on the Godavari in the Nizam's dominions. The history of these crosses must be searched for in the Hyderabad territory. Certain festivals are held on the anniversary of the decease of a relative by all these tribes, which are connected with their superstitions on the subject of the soul and its transit from the body to another state of existence. It is at these festivals that I have had the opportunity of witnessing their national dance. The similarity of these dances among these three tribes of Gonds would almost of itself establish their close relationship. The peculiarity of the Maria dance lies in the double circle which is formed by the dancers, the inner and the outer circle revolving in opposite directions as the dance progresses. The noisy but not unmelodious band takes its place in the inner circle, but the chief dancers are in the outer one. Dressed in all the finery at their command, with peacock's feathers, beads, and brass, and a light white rod in one hand to mark the time, or perchance with shield and knife and spear, they keep up a graceful and dignified step, swaying gently backwards and forwards while the circles keep ever revolving. It is hot work, especially for the inner circle, round a roaring fire on an Indian night in March, and the demand for drink becomes more and more pressing as the dance proceeds.

The ruler of Bustar is of course the raja, but the raja and his people are but slightly acquainted, for he remains all his time at his mind capital of Jungdulpore. Yet he is (according to the writings of the Mahomedan writer Ferishta) an undoubted member of the great family of the moon, a descendant of the kings of Warungal, the ancient capital of Telingana. His last public appearance in any part of his dominions, outside his capital, was, I believe, on the occasion of the Prince of Wales' visit to India. But the opportunity was too good to be lost. He met with so determined a resistance from his own people that he was obliged to return, and was shut up in an undignified manner till the arrival of British authority released him. A small local revolution of this sort attracts little attention even in India, but there were some curious circumstances connected with it illustrating the force of Gond character. The cause of it was an obnoxious Dewan whose oppressive misgovernment had led to an earnest wish on the part of all who had to do with him to get rid of him at any price. The Gonds were soon masters of

the position, yet no robbery took place, no violence, no bloodshed, not even in retaliation. "We are not robbers," they said, "but we want the removal of the man who oppresses us." They teach us something, like the dog that taught the great Napoleon a lesson in humanity as he passed over the ground at the close of one of his bloodiest victories. And it is satisfactory to record that they succeeded as they deserved.

GEOGRAPHICAL NOTES.

Employment of Elephants in African Exploration.—The King of the Belgians, being anxious to make the experiment, has made a present of four Indian Elephants to the International African Association, in aid of their expeditions now on foot in Eastern Africa. The elephants, in charge of Mr. Carter, who has had experience of travelling in Persia, have left Aden, and were due at Zanzibar on the 29th of May.—Whilst making preparations for his expedition in Zanzibar, Mr. Keith Johnston wrote for and obtained from Ceylon, information regarding the practicability of obtaining trained elephants and using them in African travelling, but the result of his inquiries did not make it prudent in him to try the experiment; the cost of their transport from India would be great, as a vessel would have to be refitted especially for their accommodation, and nothing could be learnt respecting their adaptability to the new local conditions, such as food, exposure to insect plagues, and so forth, to which they would be subjected in Central Africa. Still he thought the experiment well worth trying; in his own case the very small means placed at his service by the African Exploration Fund rendered it out of the question. He found that the actual employment of elephants in a long expedition, minus the cost of their transport from India, would, if all went well, be a great economy, as a well-saddled elephant, costing in Ceylon 125*l.*, would carry as much as fifteen ordinary loads (60 lbs.), borne by Zanzibar native porters (pagazi); so that seven elephants would be able to carry as much as 100 pagazi, whose pay is five dollars a head per month, beside the cost of their food. In his own expedition he takes ninety pagazi, at a cost per year, in wages, of 1100*l.*, whose work could be done by six elephants, the purchase money of which would be only 750*l.* The great risk would, however, have to be encountered of the elephants (or any one of them) falling ill of the many diseases to which they are known to be subject; the mass of goods, equal in each case to 15 man-loads, would then come to an anchor. Still there is the equally imminent risk of the desertion of the men, or part of them, almost every African traveller having had experiences of this sort.

Mr. Keith Johnston writes from Zanzibar on the 17th of April that all his bales were packed and numbered, and his party fully organised and ready for the start. He was about to make himself a preliminary

trip to Dar-es-Salaam before taking on the main body. His short preparatory trip of exploration to Usambara was quite successful, and he has transmitted to the Society a Report of the journey, accompanied by a map containing a large amount of new information, which will be published in a subsequent number of the 'Proceedings.' He says, "The trip was a most enjoyable one in almost every way. We had no *contretemps* whatever; except that two of the porters got fighting at a dance in Pangani, and were locked up by the Wali for an hour or two. The journey furnished an excellent specimen of the sort of travelling we shall have, and took us through a country which may be taken as an epitome of all Africa. There was a little bit of arid, level, uninhabited desert, a bit of undulating, cultivated, and populous country, and beyond that a tract of mountain forest and stiff climbing. The magnitude of the trees and the density of the forest exceeded anything I had imagined in Africa, and reminded me of northern Paraguay, only here there is much less variety in the tree forms."

Mr. Clemens Denhardt, who has been exploring in a thoroughly scientific manner the Dana or Tana River, and adjoining parts of the Galla country in Eastern Africa, is now on his return to Europe. He will have much that is new and interesting to communicate on the little-known ethnology of this part of Africa, especially about the Wapokamo of the Tana and the aggressive and encroaching Somali race, who have during the last fifteen years rapidly advanced southward across the Juba and the Tana, dispossessing the Gallas.

Major Serpa Pinto has returned to Europe via Zanzibar and the Suez Canal. The details of his discoveries are not yet made known, but a letter from him to the Portuguese Minister for the Colonies has been circulated by the Geographical Society of Lisbon. It was written at Lialui on the Upper Zambesi, on the 3rd of September, 1878, and described briefly the route he had pursued from Bihe to that point. Lialui is a place in the Barotse Valley, and is possibly the same as *Nariele* of Livingstone. In reaching this point Major Pinto struck obliquely south-east from Bihe, through the wide tract of country left blank in the map of Livingstone, except for the rivers in dotted lines introduced from vague native information. Major Pinto says nothing in his letter which throws light on the solution of the problem of the Cubango, announced in his telegram. He appears to have left that river after noting the confluence with it of the Cuito (Quito of Livingstone) and continued his march eastward, soon coming upon a great navigable river called the Cuando, or Quando, the discovery of which, with its numerous tributaries, also navigable, is probably the chief of his geographical achievements. The Cuando, he says, is no other than the Chobe of Livingstone; it is a river of great importance, and flows, with its tributaries, through a region of great fertility.

Professor Nordenskiöld has at last been heard of in his involuntary winter quarters. We have received a telegram from M. Dickson, of Stockholm, to the effect that the *Vega* is frozen in at Cape Serdze-Kamen, about 100 miles north-west of East Cape. The ice was encountered on the 25th of September last. All were well on board. The experienced leader of the expedition and his staff may be relied on for making the very best use of the winter in pursuing scientific investigations in various branches. Sledge parties, equipped by M. Sibiriakof, are now on their way to the Siberian coast to communicate with the expedition.

Colonel Prejevalsky writes from Nor-Zaisan on the 1st of April last, that he intended to leave the Zaisan post on the 2nd of April, proceeding to Bulun-togoi, Barkul, and Hami. He expected to reach Hami in the early part of June, pursuing his course to Sha-chau. From the latter place he would ascend the first Tibetan plateau, cross a swampy plain, ascend another table-land, and so reach Lhassa. From this point Col. Prejevalsky proposes the exploration of the south-east portion of Tibet, returning by way of Khotan and Kashgar, and calculating on an absence of two years. He has four companions and an escort of three infantry soldiers and five Cossacks, besides a Taranchi interpreter from Kuldja, and a Kirghiz guide who turns back at Hami. The armament of Prejevalsky's escort consists of 13 Berdan rifles, 22 revolvers, 6 fowling-pieces, with 10,000 ball cartridges, 110 lbs. of powder, and 72 lbs. of shot.

Russian Topographical Labours in the Kirghiz Steppe and in Turkistan.—Hitherto there has been a blank on the Russian maps of that portion of the Kirghiz Steppe which terminates on the north-east coast of the Caspian, between Gurief and the mouth of the Emba River; this void, extending northwards into the steppe as far as the Bliäuli and Dombayakti wells, has now been filled in from the results of a survey made last year; the locality is called Tentäk Sor, and was previously considered impassable, owing to saline swamps. It became known, however, that this tract included a series of lakes abounding in fish, and that fishermen dwelt on the margins; a surveying expedition led to the further discovery that it was filled with deep fissures, through which Tentäk Sor drains into the sea, being also inundated during strong west winds; that all Tentäk Sor was once submerged, and that the eastern side of the Caspian is gradually shallowing. The north-east coast of the Caspian is consequently now more correctly delineated. Astronomical points determined at Gurief and at Bliäuli, have shown that this part of the coast must be thrown back to the east 8 miles. The Sagyz River, which, it had been thought, lost itself in the saline mud-swamp, has been found to disembogue through two arms—the Kara-Baspak and the Alpyz-at—into the Caspian. The first is navigable up to the salt lakes

in the district. Two other surveying expeditions, one for the delimitation of the Akmolinsk and Turgai districts, and the other to the Lower Emba Fort, have resulted in a new map of the Kirghiz Steppe, on the scale of 20 versts to the inch.—In Turkistan, M. Schwartz, whilst accompanying the Russian Ferghana force to the Great Alai, determined nine astronomical points; in the company of M. Matveyef through Bokharian and Afghanistan territories, he also fixed the positions of Rustakh, Faizabad, Kunduz, Khulm, and Mazar-Terif (Mazar-i-Sharif?), taking levels at ninety-five places, and marking the deviations of the magnetic needle. Penjkent and Maghian were determined astronomically by Mr. Zaleski. Trigonometrical surveys were conducted last year in Ferghana on both sides of the Jaxartes, and topographical surveys were executed in Ferghana and in the Kurama district.—The survey of the Kizyl-Kum Desert, commenced in 1872, was continued in 1878, and an extent of 24,201 square versts has now been surveyed.—Captain Rodionof, during Messrs. Oshanin's and Matveyef's expeditions last year, laid down a route map covering 1300 square versts.—The southern littoral of Lake Balkhash has been recently surveyed by a Russian mining engineer, named Popredukhin, who has constructed several route maps, with sections, and made a large collection of various minerals. Among these he discovered large veins of what is called in French *Cire Minérale* (which is obtained in large quantities in Galicia). Samples of this mineral have been sent to the laboratory at Tashkend.

The Russian Trans-Caspian Territory.—In vol. v., No. 4, of the 'Isvestiya' of the Caucasus section of the Imperial Russian Geographical Society, we read the following statement compiled from official sources:—

After various attempts, dating back to the time of Peter the Great, to establish themselves in the country east of the Caspian, the Russians at last succeeded when they took possession of Krasnovodsk in 1869, and in spite of the revolt of the Kirghiz of Mangishlak in 1870 firmly located themselves there. Their chief object in occupying Krasnovodsk was to develop the overland trade with Central Asia, and their reconnaissances were undertaken during the years 1870, '71, and '72, in order that they might become better acquainted with the country, and strengthen their position in it. By Imperial ordinance of 1874, the occupied territory was organised under the title of the Trans-Caspian military province, and placed under the orders of the viceroy of the Caucasus. It extends from Mertvi-Kultuk Bay to the Attrek River in one direction, and from the eastern shore of the Caspian to the confines of the Khanat of Khiva in the other. The local government of this region is centred in a military commander resident at Krasnovodsk, the whole of this territory being subdivided into the two "pristafstva" (i. e. administrative districts under a "pristaf" or superintendent) of Krasnovodsk and Mangishlak, divided by a line drawn through Kara-bugaz Straits and Bay, Iltedji and Aibughir wells.

The pristaf of Mangishlak has his head-quarters at Fort Alexandrofsk, that of Krasnovodsk is the chief of the province himself. The nomad population, for administrative purposes, is divided into four volosts (i. e. communal districts), and these again are subdivided into auls or villages. The former are placed under overseers, the latter under elders; and these functionaries, always selected by the governor from among the natives, exercise police and magisterial authority. But whenever these people, with their roving habits, migrate beyond the borders of the Trans-Caspian province and enter other administrative territorial divisions, they become, *ipso facto*, subject to the governor of that country in which they happen to be nomadising. Any violations of law which come neither within the jurisdiction of the military court nor the general laws of the empire, are investigated by native tribunals, presided over by a bey, appeals being admitted in the first instance from the bey of the aul to an assize of beys, and from these to the military governor, and finally, in very important cases, to the viceroy himself.

The four volosts are as follows:—1. Busatch, with 3356 KEBITKAS on Busatchi Peninsula; 2. Tiub-karagan, with 1909 KEBITKAS, bordered by the sea on three sides, whilst on the south it marches with Mangishlak; 3. Mangishlak, with 2295 KEBITKAS, comprising the greater part of the peninsula of the same name, and bounded on the north by Ak-tau and Ak-jul hills; on the east by the Ust-Urt, and wells of Tamla, Bash-uyuk and Temir; on the south by Defe-cheganak and Kara-shagli springs, and on the west by the lands of the Turcomans, nomadising along the shore of the Caspian; 4. Turcomanian, comprising the coast-line of the Caspian from Fort Alexandrofsk to Kara-bugaz Bay, i. e. the westernmost parts of Mangishlak Peninsula. The inhabitants in the last named of these volosts are Turcomans, whilst the remainder are Kirghiz. A fifth volost will now be formed to take in the Yomuts in the pristafstvo of Krasnovodsk, nomadising between Kara-bugaz and Krasnovodsk, and on the islands of Cheleken and Ogurchinsk, numbering 1200 KEBITKAS. The Yomuts nomadising between Krasnovodsk and the Attek, have their winter quarters and half-settled habitations between the Attek and Hürgen rivers, i. e. on Persian territory, without, however, recognising Persian sovereignty. In summer they migrate in large numbers to the north of the Attek (the Russo-Persian boundary), and for eight months remain in Russian territory. These are the people referred to in the ordinance of the 13th August, 1874, which chiefly aims at the protection of the more peaceably disposed inhabitants, subject to Russia, and of caravans. By virtue of these enactments, each clan or tribe before entering the Trans-Caspian province, is bound to elect a Khan for itself, who must be confirmed in office by the Russian authorities, and is bound to submit to them as long as his tribe remains in Russian territory, and every aul must have an elder, who must maintain order and peace, and exert his authority to prevent robbery and violence.

The Khans are obliged to encamp in the vicinity of Krasnovodsk, and from time to time make the rounds of their auls. With the internal affairs of these nomads the Russians do not interfere.

The Russian population of Trans-Caspiaca inhabits forts Krasnovodsk and Alexandrofsk, or rather the immediate environs of these forts, and the village of Nikolaiefskaia, and is subject to Russian law with some modifications to suit local circumstances.

Recent Topographical Survey by the Russians, from the Oxus to Herat.*—Reviewing the Russian military topographical labours of the last year, the 'Invalide Russe,' No. 79, 13th (25th) April, gives the following description of the route from the ferry over the Oxus at Patta-Kissar to Herat, from Colonel Grodekof's survey in 1878, which was accompanied by a map,† on a scale of 50 versts to the inch :—

This route passes first through a locality which is frequently submerged by the overflows of the Amu-Daria, and is covered with rushes and brushwood; this is succeeded by a waterless sandy plain with a sprinkling of saxaïl. At a distance of 23 miles from Patta-Kissar are visible the ruins of the ancient town of Siahgird; these ruins extend for 8 miles, and terminate at the village of Siahgird, which consists of 50 dwellings. Twelve miles beyond this village lies Mazar-i-Sharif, the chief town of Afghan Turkistan, which has a population of 25,000 Uzbeks and Afghans. The country around this place of residence of the Governor-General is carefully cultivated, and abounds with orchards. At a distance of 2 miles from here is the fort of Takhtapul, with gun factories and cannon foundries, as also manufactories of swords, knives, and felt helmets. Beyond this the road passes over a level ground, cut up by aryks, through Didaadi village to Mazar-Zainal-Obedin-Baimar (32½ miles). At a distance of 7½ miles from Didaadi the road is intersected by the River Balkh, which is a copious stream, and is known by the name of Band-i-Barbari (Band, a dam, and Barbari signifying a wild people dwelling on the northern slopes of the Paropamisus and Hindu Kush); beyond this river stretches a wide extent of cultivated land, here and there broken by the remains of ancient Bactria, which, in the shape of hillocks composed of yellow and red glazed bricks, are seen from a distance.

From Mazar-Zainal-Obedin-Baimar, passing through Salman village, between a shepherd's hut and the Mogol dam (erected for the concentration of the different rills) the road (34 miles) runs in a south-westerly direction to Salmazar village, neither presenting great difficulties for the march of troops nor any drawback as regards supplies of fresh water.

At Salmazar, in the wide Shibarghán valley, the road leads across the Saripul River, turning from thence direct south to Saripul town (25 miles). Near the village of Seid-Abad, which contains about 100 dwellings, and is situated on a high hill, and within 10 miles of Saripul town, the River Saripul was for the first time found to separate into two branches running between very steep banks; from Seid-Abad to the south this river runs in one bed with very sloping banks; it is very thickly fringed with rushes, which afford food to animals and fuel to the Uzbeks, who mostly dwell in tents. The valley of the Saripul River is considered very unhealthy, very commonly producing fevers, eye disease, and skin eruptions. The town of Saripul

* Communicated by the India Office: slightly abridged.

† Existing maps do not agree with this itinerary in distances and positions, doubtless from their inaccuracy; and the Russian map above mentioned is not accessible. The best map available is Colonel Walker's Turkistan, on which Colonel Grodekof's route can be generally traced. Patta-Kissar is on the Oxus, due north of Mazar-i-Sharif, nearly on the meridian of 67° E.

is surrounded by gardens; it occupies a wide extent on both sides of the river, and has a citadel in the centre; the population consists of 3000 Uzbegs.

Emerging from Saripul, the road leads for 2 miles along the embouchure of the Mirza-Aulang stream, which falls into the Saripul River near the town; it then passes into a defile walled in by high mountains, over which, at a height of 70 feet above the stream, a road has been constructed for Afghan troops marching to Maimenah. The width of this road is exactly the breadth of a gun-carriage, so that not even a single horseman could pass a detachment on its way. Beyond Turghan-téké village the undulating heights on either side of the defile give place to precipitous rocks. The entrance into the rocky defile is commanded by a fort built of local rock by the Maimenah troops against the Afghans. The length of the defile is $8\frac{1}{2}$ miles when it opens out, and the road almost imperceptibly enters a wide hollow surrounded on all sides by high mountains.

Descending from various sides, several streams run through this hollow, forming by their union the Mirza-Aulang River. In the beginning of November the valley of this river was covered with verdure, thus justifying its appellation, which means the green meadow of the Mirza. A village of the same name is situated at a great height on one side of the road. A very steep pass, nearly 3 miles long, leads from the bottom of the hollow over a high range of mountains forming the water-parting between the Saripul and Sangalak river basins. The descent is also about 3 miles long. At the foot of the pass is a defile $3\frac{1}{2}$ miles in length, and from 8 to 10 paces wide; the sides are from 100 to 140 feet high, and in parts these contract to such a degree that one can step across the chasm; in these places no rays of the sun can penetrate below. Some archa and deciduous trees cling to the sides of this defile.

On emerging from this defile the road passes into the rich and cultivated valley of the Kurcha village (300 dwellings), occupied by Uzbegs, and provided with a citadel. From Kurcha to Belcheragh (300 dwellings) the road lies for the most part over a soft soil through Uzbeg kishlaks and orchards. Beyond Belcheragh it again enters a rocky defile with precipitous sides; on the right side of the entrance is a cavern, which was made in the rock by a saint. In the inner cell there was a lamp (cheragh) constantly burning, from which the village has taken its name. This defile is 8 miles in length, and is throughout its entire extent cultivated and covered with orchards. All the way through the defile, and on emerging from it, the road passes along the wide and deep Belcheragh River, as far as the descent into the open valley of Maimenah.

The town of Maimenah is surrounded by a wall 20 feet in height; it has a citadel and redoubt. Three years ago it was besieged by the Afghans, in evidence of which there is a heap of ruins; the place contains 2500 Uzbegs. From Maimenah the road passes over a series of mountain spurs, through defiles, across various rivulets, and the Almar River, close to which is situated the village of Almar, containing 60 dwellings, until it reaches Kaisar village, 29 miles distant from Maimenah. Kaisar village, peopled by Uzbegs, contains 250 dwellings. From Kaisar to Charshambé village (400 dwellings) the road trends partly through a rock-strewn valley, and partly over mountains and through numerous kishlaks. The Kaisar valley is subject to raids by Téké Turcomans. From Chichaktu there is evidence of these raids at every step, in the neglect of the fields and of the irrigation canals, while reeds have been suffered to overgrow the banks of the rivulets, and give shelter to wild beasts. No one dares to go unarmed beyond the precincts of the villages.

In consequence of the depredations committed by the Tékés, the caravan route leading to Herat along the Kaisar River, and further along the Murghab and through the country of the Firoz Khois, has been abandoned.

From Charshambah Colonel Grodekof followed the regular road to the ruins of Takhta-Khatyk fort, from whence he turned to the left over several ascents and descents, finding everywhere capital lands, but long deserted and infested with field mice.* Numerous neglected aryks occur along the road, which was generally speaking very difficult as far as the ruins of the Kala-Vali, on the Kaisar River. From the latter place Colonel Grodekof turned abruptly to the south-west, and marched 17 miles over unbroken ground, until he entered a valley at the base of the high range of the Kara-Jangal. A rivulet passes through the valley which takes its rise from the Kara-Jangal Pass, and along which lies the "thieves' track" leading up to the pass. The ascent is very steep, and is covered with a scattering of stones, as well as with archa and pistachio trees. The mountain range is parallel with the Paropamisus, and is not inferior to the latter in height. It is barely possible to keep one's seat on horseback in descending the pass. Beyond the pass the "thieves' track" turns to the north-west and gradually descends to the Murghab; it again leads over a low spur of the mountains and enters a narrow rocky defile; at the point of exit from this defile, on a rock some 350 feet high, are the ruins of Fort Bala-Murghab, which marks the frontier between Afghan Turkistan and the province of Herat.

From Bala-Murghab the track turns direct south and enters the wide Murghab valley, which is skirted on the right by a high rocky mountain side, and on the left by low undulating hills. Although it was drawing towards the middle of November, and although there was no snow on the mountains, and no rain had fallen, the Murghab was fordable at only one particular place, where the depth of water reached above the saddle-girths. As regards the valley, the traveller finds it very difficult to make his way across, owing to the thick grass and rushes which entirely hide the track, for the foot of man but seldom treads there. On leaving the valley, the path leads through the mountains to the village of Darabaüm, the inhabitants of which are of the Firoz Khoi tribe and of Persian origin. Further on, the road crosses several low passes and open plains, which are dotted with the tents of the Hazarchs, who are of Mongol origin, until it reaches Kalei-Naù, the chief town of that tribe. At Kalei-Naù there are two forts, of which one is old and the other new, a bazaar, and a great many clay-built dwellings, although the majority of the people live out in tents.

At about $1\frac{1}{2}$ mile from Kalei-Naù, in the direction of Kushk, the road enters a forest of pistachio trees, which extends 29 miles over a hilly ground; beyond this forest commences a steep ascent, after which follows a descent into the basin of the Kushk River, the valley of which contains several villages generally called Kushk. The inhabitants of these villages are of Persian origin, and live mostly in the valleys.

One mile and a half beyond the principal village, containing a citadel and a khan's palace, commences an ascent of nearly 5 miles up the Paropamisus. At first this ascent is gradual, and leads over a soft ground, but towards the summit it becomes very steep and rocky. The pass called Hazret-i-Baba (from Mazar, which is situated at a distance of about $1\frac{1}{2}$ mile from the summit), is covered with snow from the end of December to the end of April. Communication, however, over the pass remains open all the winter through; the pass is only not attempted when clouds gather over the Hazret-i-Baba, which is a sign of a snowstorm on the top. The summit of the pass and the descent are rocky. The path winds down along the margin of a deep ravine, in which runs a small stream fringed with willows; the path leads several times across this stream before reaching Shirmaz village (30 dwellings), the Persian inhabitants of which frequently suffer from Turcoman forays. From Shir-

* See Ferrier's 'Caravan Journeys,' pp. 188-199.

maz to Herat it is only 12 miles. Crossing a low spur of the Paropamisus, the road emerges on a plain valley, containing a series of villages, which constitute the outskirts of the city of Herat. Herat contains about 50,000 inhabitants. After Meshed, Herat occupies the second place among the cities of Central Asia and Khorassan; the streets are winding, narrow, and dirty; the city is surrounded by a stone wall, with a shallow fosse in front; at the counterscarp there are houses which form a continuation of the city. In the interior there is a citadel with a deep moat filled with water and choked with reeds.

From the ferry at Patta-Kissar to Herat Colonel Grodekof traversed 406 miles of country.

New Maps of Afghanistan.—The office of the Surveyor-General of India has been much occupied during the past winter in the reproduction, by photozineographic and other rapid processes, of surveys, sketches, reconnaissances, plans, maps, and so forth relating to Afghanistan. Many of these consist of fac-simile reproductions of documents relating to the last campaign in that country, but some are new compilations undertaken on the recent outbreak of hostilities, and others again are rapid reproductions of recent surveys, undertaken by some of the surveyors attached to the three expeditionary columns. Of the first class may be mentioned a variety of plans, sections of fortifications and views, of Candahar, Kalat-i-Ghilzai, Girishk, Ghuzni, Kabul, &c. Many of these will probably be new to most students of Afghan geography, being taken from original documents in the Quartermaster-General's Departments. In the second category are a continuous series of maps, all on the scale of 4 miles to an inch, viz. :—

Routes from the Sind and Punjab frontier to Quetta.

Routes from Quetta to Candahar, and from thence to Kalat-i-Ghilzai.

Routes from Quetta and Kalat-i-Ghilzai to Kabul, and

Country about Kabul and Ghuzni, with the routes leading to India.

All the above have been compiled in the office of the Quartermaster-General at Simla, and though without any pretension to style, are clear and useful maps. Of recent surveys the following have been published :—

Sketch of the position taken up by the Afghan troops holding the Peiwar Kotal and Spiri Gawai passes, which was attacked and carried on the 2nd December, 1878, by the Kuram field force, under the command of Major-General F. Roberts, C.B., V.C., R. G. Woodthorpe, Captain R.E., in charge survey party.

Index map Adam Khel country, surveyed season 1877-78, by Major-General H. C. Johnstone, C.B. Scale 1 mile to an inch.

Portion of the country inhabited by the Adam Khel Afridis, comprising the Gallai or Pass Afridis, Jowaki, Hassar Khel, and Ashu Khel, surveyed during the operations of the field forces under the command of Brigadiers-General C. P. Keys, C.B., and C. C. G. Ross, C.B. Scale 1 mile to an inch. Surveyed by Captain R. Bevan, assisted by Messrs. A. J. Gibson and G. B. Scott.

Military reconnaissance of the country from Jumrood to Jelalabad. By Major H. C. B. Tanner, B.O.S.C., Deputy Superintendent Survey of India. Scale 1 mile to an inch.

Besides the above, there are several detached portions of survey, reconnaissances, and brief reports from various officers whose duties have led them in different directions off the main lines of advance, and whose work when pieced together will add materially to our topographical knowledge of the country.

The Indo-Chinese Peninsula. — In his recent report on the trade and commerce of Saigon and Cochin-China, Mr. Charles F. Tremlett, our Consul at Saigon, furnishes some useful geographical and ethnographical notes. With regard to the leading divisions of the region, about which a little uncertainty prevails, he remarks that, leaving the vast and for all practical purposes unexplored region of Laos out of the question, the peninsula, commonly denominated Cochin-China, is now composed of Cambodia in the north, French Cochin-China in the south and west, and Annam on the eastern coast. This latter kingdom extends northwards to the Chinese provinces of Yünnan and Kwangsi, its own province of Tongking adjoining them. Mr. Tremlett gives some concise historical details respecting Annam and Tongking, and in regard to the origin of the people, he remarks that a Malay invasion took place in A.D. 767, and the whole coast, from Cape St. James to the Chinese frontier, was at one time inhabited by a people of Malay descent. The prevailing opinion seems now to be that the present race of Annamese is of a Malay origin, greatly modified, however, by Chinese intermixture. In appearance, language, and most other characteristics, the Cambodians, to whose country Mr. Tremlett devotes a brief space, differ entirely from the Chinese, Annamese, and even Siamese, although they resemble the last more than the others. It may be interesting to mention that there is an overland track from Saigon to Hue, the capital of Annam, but, as may be supposed, it is not much frequented, and has not lately been explored. The distance is 400 miles, and it is known to be practicable for horses throughout its entire length. Mr. Tremlett concludes his report with notes on some of the islands off the coast. Of these the largest is Phu-Guoc (a name not given on some of our maps), which is situated off the western coast of Cochin-China, in the Gulf of Siam. The coast-line is formed of hills some 1800 feet in height; the interior is almost in a state of nature, being for the most part covered with forests and occasional marshes; a road, however, has been laid out through the island from east to west. It was at one time reported that coal existed in large quantities, and great preparations were made for working it, but samples, when analysed, proved to be of very bad quality, apparently of too recent formation, and the enterprise has been abandoned. The forests of the island contain very large trees of different and excellent qualities, suitable for house and ship-building purposes, but the present difficulties of transport stand in the way of their being utilised. Coffee and vanilla have been successfully planted within the past four or five years.

The Treaty Port of Wên-chow, Chinese province of Chekiang.—The first report on the trade of the newly-opened port of Wên-chow, made by the Chinese Customs officials, contains three illustrations of considerable interest. The first is a sketch map of the watercourses of the Wên-chow prefecture and adjoining region, on which are shown the districts where tea, opium, rice, iron, alum, silver, and wild silk are produced. The second is a reduction of the survey map of the port of Wên-chow by the officers of His Imperial German Majesty's ship, *Cyclop*; while the third is a large-scale Chinese map of the town, showing its position on the river, &c.

Survey for Proposed Trans-Continental Railway in Northern Australia.—In continuation of a note in the March issue respecting the 'Queenslander' exploring expedition under the leadership of Mr. Favene, we gather from a recent number of the 'Colonies and India' that the party arrived at Powell's Creek on January 13th. They had experienced intense heat, and found the country extremely dry, very little rain having fallen for two years; a large tract, however, of flooded country was passed between lat. 18° and 19°. The expedition could not make direct for Daly Waters owing to want of water, and they intended to go 50 miles north and then cut a track across country. As these sheets are passing through the press, a telegram, dated Sydney, April 24th, has been received, via San Francisco, announcing that the survey has been successfully carried out to Port Darwin without encountering any serious obstacles. Whatever may be the prospect of the speedy construction of a trans-continental line of railway, for which, as far as our information extends, the country appears well suited, this expedition will have rendered good service in opening up new country, and in giving future surveyors an idea of the route.

Curious Cave Formation in Queensland.—Attention has lately been called in a Queensland paper to the discovery and partial exploration of an extensive cave a few miles distant from Rosella Plains, North Kennedy district. The telegraph line passes within 400 yards of the cave, but its existence was unknown until about a year ago. The account alluded to is furnished by one of the explorers, and, as his description of the country traversed on the way to the cave is of some interest, a portion of it is here given:—

"Starting from Rosella Plains at 7 o'clock one fine morning, we struck out in a north-easterly direction, our route intersecting numerous basalt ridges (all this portion of the district is volcanic), the interlying country being, generally speaking, composed of fine black-soil valleys rich in the very best fodder-grasses and herbs. I noticed several species of saltbush and two cynodons. *Danthonia* and many grasses were also well represented. A curious feature, and one which would be welcomed all over the colony, is the presence of glorious running streams in every

third or fourth valley. These brooks take their sources close to the watershed of Junction Creek, and, being joined in their course by numerous rills from ever-running springs, swell into swift-flowing streams of beautifully clear water. I have travelled over nearly the whole of Northern Queensland, and through portions of the southern districts, but I have never seen any country which could be compared to this volcanic country round Mount Lang. The patches of scrub (*Melaleuca leucodendron*), of small-leaved tea-tree, and (*Grevillea robusta*) oak characteristic of our volcanic tableland, abound here, and give a park-like appearance to this part of Queensland surpassing in beauty any stations I have ever seen. Every now and again we came upon the sources of new springs, indicated by swampy basins covered with a dense growth of blady grass (*Imperata arundinacea*), and bordered by large swamp oaks, umbrella-trees, and a wealth of scrub vegetation utterly unlooked for and unexpected in country so far inland. Large clumps of pandanus add beauty to the scene, growing as they do in such curious diversity of form, from the simple stem to the many-armed candelabra-shaped and many-headed trees. These seem to be the favourite resting-places of that beautiful family of Australian birds, the Fringillidæ or finches. I have repeatedly counted as many as twelve nests in one pandanus, the long sword-shaped leaves affording them such ample shelter from the inclemencies of the weather or the great tropical heats. I also noticed a very fine clump of Leichhardt trees (*S. cordatus*) near one of these swamps. Belonging as it does to the natural order Rubiaceæ, it would be well worth our while to institute a few experiments as to the usefulness of its bark in fevers. Having ridden some 12 miles we crossed the telegraph line, about 12 miles from Junction Creek telegraph station, and close under a high granite hill which protrudes here through the basalt."—Some 400 yards from this hill, amidst a clump of green bushes on a dead flat, a funnel-like hollow was accidentally discovered about a year ago. Descending this funnel, the party found an opening 20 feet high and 40 feet broad, from which was a sloping bank down into the cave. The formation of the cave is an almost perfect arch, the average height being about 40 feet and the breadth 60 feet to 70 feet. This shape and measurements extended as far as the party were able to push their reconnaissance. No stalactite depended from the roof, but a layer of stalagmite was noticed. On each side of the cave a deep gutter ran the whole distance, generally 3 feet deep, and 4 feet or 6 feet wide at the top, giving the appearance of a made road to the remainder of the cavern floor. After 180 yards the cave trended to the left towards the granite hill mentioned above and about 800 yards from the mouth a spot was reached where the roots of a ficus had pierced the roof, and pushing downwards had grown into and along the floor of the cave. The floor now became damp and slippery, and after traversing several hundred yards more with some

difficulty, the party reached water, which was so intensely cold that they were compelled to give up further attempts at exploration. It is thought that this cave is the former channel of an underground river, as many of the creeks in this lava country disappear underground, and after several miles reappear from the foot of a basaltic bank or wall. Should this theory be correct, it will have an outlet perhaps several miles from its present mouth, but it will take time to explore it thoroughly, for which purpose a canoe will evidently be necessary.

Lieutenant Wheeler's Survey Work in Oregon, 1878.—We have received from our correspondent, Mr. J. W. Goad, F.R.G.S., one of the Survey party, an account of Lieutenant Wheeler's operations in Oregon during the past year. On the road northwards from Reno in Nevada along the Californian eastern boundary, Pyramid Lake, which receives the Truckee River and has no visible outlet, was explored; it is 40 miles long, of immense depth, and conspicuous for its white columnar rocks, and is probably the least known of the North American lakes. It appears an open question whether there is subterranean drainage in this part of North-west Nevada, or whether the dry climato evaporates the surplus water in the valleys. Crossing the Californian border at the volcanic Warner Range, the oasis of Surprise Valley, a fertile space of 50 miles in the midst of an arid sage-bush country, was visited, and its thermal springs examined. Oregon was entered near Mount Bidwell, a bluff terminating the Warner Range to the north, and here the party was organised, one of its objects (approved by General Humphreys) being to make a complete reconnaissance of the Cascade Mountains, and a survey of the area between them and the 119th meridian. After crossing the arid and volcanic Oregon Desert to the alkaline Lake Abert (where the party narrowly escaped Indian attack), a peculiar difference was observed between the valleys of the Chewaucan and Summer lakes, the latter, though only 300 feet lower, and but a few miles distant, having a considerably higher temperature. Its waters were strongly impregnated with borax, &c. The Klamath Lakes were also visited, and found to present the same typical features as Pyramid Lake, undoubtedly belonging to the Great Basin plateau. At Klamath, Lieutenant Wheeler divided the party, himself exploring the Cascade Range, parallel to the Pacific coast, and Lieutenant Symons, Mr. Goad, and others carrying the triangulation to the north. Mount Pitt, 4000 feet above the country level, and 10,000 feet above the sea, was scaled with great difficulty, on account of lava, fallen timber, and rock-slides; the latter are accumulations of débris held in position by some slight and unseen projection, and only requiring the weight of a man or removal of a stone to set them in motion.

From another peak, Crater Lake came in sight,—a vast body of water confined in vertical cliffs 2000 feet high; its area is about 50 miles,

and the geological evidence indicated comparatively recent volcanic action. Proceeding northwards, many huge piles of rock, deep snow banks, and innumerable small lakes were found, the party on one occasion passing through a frozen snow tunnel 70 to 80 feet thick. This work on the mountain crest was at last stopped by the dense forests and tangled undergrowth—thousands of acres of which are often set on fire by the Indians when driving game, the entire consumption of oxygen in the woods causing the flame to rise and form a sheet miles in length and from 100 to 500 feet high.

Leaving the mountains for the Deschutes Valley, it was found that the turbulent river of that name, after apparently emptying itself into a lake with no outlet, percolated through piled-up masses of lava on its shores, and reappeared 10 miles farther north. It can never be navigable, on account of its numerous cascades and rapids. Mount Jefferson was visited, but found impracticable from the lateness of the season. On the road from its base to Dalles on the Columbia River, the warm springs, much visited by Indians, were examined; their waters collect in basins, which are impregnated with a green mineral substance. Interesting data concerning Mount Hood (12,000 feet) were obtained from Mr. Walker, of the Warm Spring Agency, who had ascended it; far above the snow-line, hot steam issues from craters on its side; 500 feet from the top is a large basin, with the main crater, giving out sulphurous steam. Other craters and huge glaciers exist also on its south-east side. The White River, which rises in Mount Hood, owes its name to a sediment of pulverised pumice, which is washed far down the Columbia River in quantities sufficient to form white dunes on its shores by the action of the winds; its falls were some 180 feet high.

At Dalles, a base line was measured, and a series of triangles carried into Washington Territory. In summing up the capabilities of Oregon, which, west of the Cascades, are well known to be very great, it is observed that, although to the east of that range the rainfall is not great, the land is very fertile in the Deschutes Basin, and the supply of water for irrigation abundant.

Geographical Department, British Museum.—In the Annual Return of the British Museum, which was published by order of the House of Commons in the middle of May, is included a report by Mr. R. H. Major, F.S.A., the Keeper of the Department, on the progress made in the cataloguing and arrangement of maps, charts, plans, and topographical drawings, with an account of accessions made in the year 1878. The number of maps which were received under the Copyright Act, was 876, in 2728 sheets, in addition to 25 atlases and 6 parts of atlases; 319 atlases and 1246 maps were purchased, while 7 volumes and 612 maps and drawings, in 816 sheets, were presented. Besides the students who consulted maps and atlases in the Reading Room, 316 persons in the course of the year visited the department for the purpose of making

special geographical inquiries. Among the most interesting purchases of the year enumerated in the Report, we note the following:—

A photographic reproduction of a Hydrographical Chart on parchment, of the date of 1385, in the Royal Archives, Florence, comprising the Atlantic as far as Cape Bojador, at that time the *ne plus ultra* of geographical discovery southward, to Syria and the Black Sea eastward. On this chart, which is earlier by nearly half a century than the effective discovery of the Azores by Diego de Seville and other navigators, under the auspices of Prince Henry the Navigator, we find the islands of San Miguel and Santa Maria laid down, but with an illegible inscription, while the islands of San Jorge, Fayal, and Pico are described as “Insule de Ventura” and “Columbis,” and Terceira is named “Insula de Brazi,” so called from the Brazil wood with which it abounded, thus preceding its famous namesake in South America by a century and a quarter. The Chart bears the following epigraph, “Guill[ie]lmus Solerij civis Maioricarum [i. e. native of Soller in Majorca] me fecit anno a Nat. Domini M^occclxxxv.”—A photographic reproduction of a Hydrographical Chart on parchment, also late in the fourteenth century, in the Royal Archives, Florence, comprising the Mediterranean and Black Seas. It bears the following epigraph, “Presbiter Joannes rector Sancti Marci de Porta Janue me fecit.”—A series (very rare) of 11 Plans, Perspective Views, and Sectional Drawings of the Escorial, engraved and published in 1587 by Pierre Perret, of Antwerp, from the original drawings by the Architect, Juan de Herrera, the pupil and successor of Juan Bautista de Toledo, who laid the first stone of the Escorial in 1563. To Herrera is attributed the plan of the church. To this copy is appended a reprint on one sheet of the descriptive catalogue or summary published by Herrera in 1589, Madrid, small 8vo., “Sumario y breve declaracion,” &c., now excessively scarce, only three copies being known, one of which is in the Library of the British Museum.

A New General Work on Geography.—M. Charles Hertz, the founder of the Society of Commercial Geography at Paris, has lately commenced the publication of a general work on geography on a large scale, entitled ‘La Géographie Contemporaine d’après les Voyageurs, les Émigrants, les Colons, les Commerçants.’ An important feature of the work is to be the original maps, from 600 to 800 in number, with which it is to be illustrated, and which, to judge from the specimens that have appeared so far, will be remarkable for beauty of execution, as maps printed with and illustrating the text. The work is divided into ten series of two or more volumes each, and the following are the subjects treated of in the first five series:—(i.) Polar and Maritime Expeditions; (ii.) Explorations in Africa and African Societies; (iii.) Explorations in Asia and the Asiatic races; (iv.) Explorations in Australia, the Pacific Ocean, and North and South America; and (v.) the Means of Communication throughout the World, Telegraphs, Railways, and Maritime Routes; Geographical Societies and Institutions, and the work performed by them. The succeeding five series will be devoted to a description of the nations of European origin and their enterprises in all parts of the world. The work is being issued in weekly parts of sixteen pages. Each volume will contain some 480 pages with about sixty illustrations, and is to form a complete work by itself. M. Hertz

furnishes the following summary of the two volumes comprised in the first series :—

PREMIER VOLUME.—I. Le pôle Nord, ses visiteurs, ses habitants.—II. Les dernières expéditions à la recherche du pôle ; résumé historique des expéditions antérieures.—III. Les tentatives de passage au nord-ouest et au nord-est.—IV. Les entreprises de colonisation polaire en cours d'exécution, leurs dangers et leurs ressources.—V. Le pôle Sud et les voyages qui y ont été entrepris.

DEUXIÈME VOLUME.—I. L'océan Atlantique, ses courants maritimes et aériens, profondeurs de son lit.—II. Exploration des fonds de l'Atlantique, sa flore et sa faune.—III. La mer des Sargasses, l'ancienne Atlantide.—IV. Les mers australes et les pêcheries maritimes.—V. L'océan Indien et l'océan Pacifique : leur circumnavigation, leurs profondeurs.—VI. Tableau général des mouvements de l'air et des eaux à la surface du globe.—VII. Panorama de la vie maritime et drames de la mer.

Obituary.

Commander George Chaworth Musters, R.N.—Lieutenant Musters, the adventurous traveller in Patagonia, whose loss at an early age we deeply deplore, was born at Naples while his parents were travelling in Italy, on the 13th February, 1841. His father, John George Musters, was the eldest son of John Musters, Esq., of Colwick, "the king of gentlemen huntsmen," and Mary Ann Chaworth, of Annesley, the "Mary" of Lord Byron's touching poem the "Dream." Our deceased associate's father served in the 10th Hussars, but left the army in 1837, before his marriage with Emily, the daughter of Philip Hamond, of Westacre, Norfolk. Three children were the issue of the marriage: John Chaworth Musters, of Annesley, born in 1838; Mary Anne, who married Horatio Parkc, R.N.; and the subject of this notice, born as above stated, in 1841. The father dying soon after in 1842, and the mother in 1845, George Chaworth Musters was brought up principally by his uncles on the maternal side, one of whom, Robert Hamond, had sailed with Admiral Fitzroy on the famous voyage of the *Beagle* to South America. His uncle on the father's side, Charles Musters, was also in the navy; he died as a midshipman on his first cruise, and was buried at Bahia. Young Musters received his education at Mr. Saxby's (the now famous weather prophet), in the Isle of Wight, and at Mr. Green's at Sandgate. He then went to Burney's to prepare for the navy, and entered the service on board the flagship *Algiers* in 1854. The war with Russia then impending, the *Algiers* proceeded at once to the Black Sea, where Musters served with distinction, receiving the Crimean medal at fifteen years of age. In October 1856 he was transferred to the *Gorgon*. He subsequently served in the *Chesapeake* (1857–58) and the *Marlborough* (1859–61), and passed first class in his examinations in 1861, immediately whereupon he was appointed as mate to the Royal yacht *Victoria and Albert*, from which he was promoted to the rank of lieutenant in 1861. He served as lieutenant of the *Stromboli* sloop (Captain A. Philips) on the south-east coast of America from December 1861, until she was paid off in June 1866. During this period he bought land and began sheep-farming near Montevideo. In a boyish freak, he and a midshipman belonging to the *Stromboli* climbed the celebrated sugar-loaf mountain in Rio harbour, and planted the British ensign on the top, where it remained for some years, in spite of various efforts to remove it. This was in 1862.

He had conceived the idea of travelling across South America very early in life, but it was only after his retirement from the active list of the navy that he resolved

to try to carry out the object of his boyish ambition. The result was the journey through Patagonia in 1869-70, so well and fully described in his book 'At Home with the Patagonians,' published in 1871. In this bold and adventurous undertaking Musters lived on the most friendly terms with the wild aborigines of this inhospitable region, and travelled with one of the hordes the whole length of the country from the Straits of Magellan to the Rio Negro, afterwards traversing the northern part from west to east, a distance altogether of 1400 miles. The results of this journey were a considerable addition to our knowledge of the geography of the region, particularly along the eastern slopes of the Andes, along which Lieutenant Musters' route chiefly lay; also full details of the character and customs of the Tehuelche tribes, and much interesting information regarding the climate. In recognition of this great exploit he was awarded, at the anniversary meeting of the Society in 1872, a presentation gold watch, with a suitable inscription.

The life of exposure and the open-air habits attendant on such a journey had a peculiar effect on Musters' constitution, for on his return to England he would often prefer to sleep on a rug in the garden, although at other times suffering greatly from the cold. After his travels in Patagonia, he visited Vancouver Island and North America, and had some interesting adventures among the Indians in British Columbia, a narrative of which from his journals, we hear, is to be soon published. He afterwards went back to South America, and set out on a journey across Chili and Patagonia from west to east, but he was obliged to return to Valparaiso. Returning to England in June 1873, he soon after married the daughter of Mr. Williams, of Sucre, in Bolivia; returning to South America with his wife, with a view to residing in Bolivia, in 1874. During his residence here, from February 1874 to September 1876, he had plenty of opportunities of gratifying his love of exploration. He travelled much, and gathered a large amount of geographical information, which was embodied in a paper read before the Society in November 1877, and printed in the forty-seventh volume of our 'Journal.' Since his return to England in 1876, he had lived principally in his brother's house at Wiverton, in Nottinghamshire, the remains of a castle that was defended by his ancestor, Lord Chaworth, against Cromwell during the civil wars.

The last three months of his life were spent in London preparing for the duties of a post to which he had been appointed by the Foreign Office, that of Consul at Mozambique. A few days previous to his intended departure for Africa, he was suddenly stricken down by an attack of pyæmia consequent on the opening of an abscess to which no serious importance was at first attached, and he died, at the age of thirty-eight, on the 25th of January last.

REPORT OF THE EVENING MEETINGS, SESSION 1878-79.

Tenth Meeting, 28th April, 1879. — Sir RUTHERFORD ALCOCK, K.C.B.,
Vice-President, in the Chair.

ELECTIONS.—*Augustus Hendy Dimmer, Esq.; William W. Dunkley, Esq., M.D.; James Newton Goren, Esq., M.A.; Edward King, Esq.; Robert Mullan, Esq.; Lord Reay; Ezra Tompkins Wilks, Esq.*—HONORARY CORRESPONDING MEMBER; *Professor Pieter Johannes Veth, President of the Geographical Society of the Netherlands.*

ANNOUNCEMENT OF THE AWARD OF THE ROYAL MEDALS OF THE YEAR.

The CHAIRMAN announced, in the following terms, the award of the Royal Medals for the encouragement of Geographical Science and Discovery, which had been agreed upon at the Council Meeting of that afternoon :—

The Patron's Medal had been decided to be given to Lieutenant-Colonel Prejevalsky, whose name, he said, must be familiar to all the members of the Society, as that of one of the most distinguished explorers of perhaps the wildest and most uncivilised country on the face of the globe, with the exception of Africa. He had travelled over the vast tracts and steppes of Mongolia and the high plateaus of Tibet, among many races and tribes, over upwards of 3000 miles, laying down the exact routes, and making astronomical observations. His two volumes, which had been admirably translated by Mr. Delmar Morgan, were among the most interesting records of Asiatic travel which this generation had produced. He was quite sure that the members of the Society, who looked only to the scientific objects and the geographical fruits of explorations, would not be sorry that it had fallen to the lot of an officer of the Russian staff, which had done so much good work for geography for so many years, to receive the highest honour which the Society could bestow.

The second (or Founder's) medal had been awarded to Captain W. Gill, R.E., who had for many years devoted himself and a considerable fortune, out of pure love of science and geographical exploration, to carrying out various travels in Persia, Tibet, and China, and who had produced some of the most perfect maps, itineraries, and hypsometrical observations that had been seen for a long time. The Council had felt that they could not do better than bestow this honour on an officer who had given so much time and money and ability to the exploration of those little-known regions. He was quite sure that the Society would entirely approve of what the Council had done. If they had searched the world through he did not know that they could possibly have found two men more worthy to receive the Society's medals.

The medals would be presented at the Anniversary Meeting on the 26th inst.

The following paper was then read by the author:—

Across China, from Chinkiang to Bhamo. By the Rev. J. McCarthy.

The paper, with discussion, will be published in a future number.

Eleventh Meeting, 12th May, 1879.—FRANCIS GALTON, Esq., F.R.S.,
in the Chair.

PRESENTATIONS.—*Dr. G. Smith; Major-General James Steel.*

ELECTIONS.—*Edward Almack, Esq.; David Bain, Esq.; William Brown, Esq., B.A.; Major-General Edward Tuite Dalton, C.S.I.; James Graham, Esq.; James Nichol, Esq.; Thomas Pengelly, Esq.; Major-General James Steel; James Stilwell, Esq.; John William Tillbrook, Esq., M.A.*

The subject of the evening was a Science Lecture (the second of the course for Session 1878-9) entitled:—

The Modifications of the External Aspects of Organic Nature produced by Man's Interference. By Professor Rolleston.

(The lecture, together with the remarks of speakers, will appear in a subsequent number of the 'Proceedings.')

PROCEEDINGS OF FOREIGN SOCIETIES.

The International Congress at Paris for deciding on the question of an Interoceanic Canal across the American Isthmus.—The Congress was opened on the 15th of May, at 2 p.m., in the Hall of the Geographical Society of Paris, the President of the Society, Vice-Admiral de la Roncière le Noury, receiving the members and proposing M. de Lesseps as President of the Congress. After the speeches of welcome and the nomination of five Vice-Presidents, representing England, Spain, the United States, Italy, and Russia, the members formed themselves into five Sections to discuss the various aspects of the question: 1, statistics; 2, commerce; 3, navigation; 4, engineering works; and 5, management.

The Sections commenced their labours on the following day, the 16th, at 9 a.m., and it is remarked that few congresses have had so much detailed work laid before the members. The second Section, however, got through its work rapidly, and at the second general meeting, on the 19th, presented its report, which, however, dealt chiefly in generalities, and was observed to be deficient in those precise data which were required by the programme. The third Section (navigation) gave in its first report on the 23rd May. The Section saw no serious difficulties in the way of the arrival and departure of vessels, but recommended the employment of steam tugs for those ships that would be subject to detention by calms. It insisted also on the advisability of providing other ports of refuge and commerce, beyond the entrances to the canal on both coasts.

Up to the evening of that day (the date of our correspondent's letter) the other Sections had not presented any report, and it was therefore difficult to say what would be the final decisions of the Congress.

At first, the general opinion was that the question the Congress had to deal with had but two solutions—to choose between a level canal, with or without tunnels, and a canal with locks. This choice being made, the route would be virtually settled, as all the partisans of the level canal were in favour of the Panama route, and their opponents of that of Nicaragua. It was natural that the former should be the more numerous, and it was thus considered that the question was almost decided.

It was, however, gradually perceived that the affair was not altogether so simple a matter. The statistical Section appointed to estimate the amount of tonnage that would be likely annually to pass through the canal, found that it had undertaken a considerable work; because, besides the commerce of the Great Powers, there were others, the returns of which were very incomplete. The valuation of the probable tonnage that would pass the canal was a prime consideration, for according to the revenue derivable from this source the cost of the work must be

regulated. It had therefore to defer its conclusions; but as far as it has gone the results obtained are satisfactory.

The fifth Section, appointed to examine the ways and means of working the canal, could not arrive at a conclusion without having some knowledge of the results obtained by the first Section, and its sittings were suspended on the 23rd May.

In the fourth Section, a statement of the principal routes proposed was to be submitted before proceeding to a general discussion. Amongst these lines was that of Nicaragua, advocated by Commander Menocal and M. Blanchet; that of Panama, by MM. Wyse and Reclus of the one part, and of the other part by Commander Meunier; and lastly, the southern line of the Atrato-Napipi of Commander Selfridge. These successive statements occupied twelve sittings of the Section. Shortly after commencing the general discussion of these routes—in which Mr. Hawkshaw took part—the necessity became apparent of having detailed models of the different forms of canal proposed: 1, on the level, and entirely open to the sky; 2, level, with tunnels; and 3, with locks surmounting the differences of level. The engineers of the Suez canal, the St. Gothard tunnel, and the port of Amsterdam, were constituted a Sub-section to execute these models, and they have not yet completed their work.

The outside public will naturally wish to know the opinion of the chief members of the Congress; that, however, is exceedingly difficult to state, on all points. They are all in favour of a level canal, either with or without a tunnel, if such is possible; but they may very probably vote for a canal with locks if the other seems too expensive. Speaking broadly, no grave objection, from any authority, has been raised against the tunnel system, beyond that of the cost of execution. It would occupy too much time to indicate here the observations to which an examination of the different routes has given rise.

All, up to the date of our report, had abstained from definite expression of opinion, except certain members who arrived at the Congress with their minds made up beforehand. These are few, and were divided into two parties, who have neglected no opportunity of disputing.

This, in summary, is the aspect of the Congress. As to the authors of projects, they passed each day in alternation of hope and discouragement. The engineers of the United States alone declared that, whatever might be the final judgment, they would accept it without reserve; for public opinion in America had pronounced itself decidedly to this effect.

Geographical Society of Paris.—April 18th, General Meeting: Le BARON DE LA RONCIÈRE LE NOURY, President, in the Chair.—The President delivered an address, in which he dwelt upon the continued development of the taste for geographical studies in France. There were now Geographical Societies not only at Paris, but at Lyon, Marseilles, Bordeaux, Montpellier, Oran, Nancy, Rouen,
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and Rochefort. To the Bordeaux Society were attached as satellites those of Bergerac and Agen. All gravitated as independent bodies around the parent Society at Paris, and were animated by a spirit of friendly emulation which worked for the good of their members and the advantage of geography. He also alluded to the approaching meeting of the Congress summoned for the 15th May in order to discuss the best route for an interoceanic canal across the American isthmus; the Society had placed at the service of the Congress their new large hall.—A Report on the award of the medals of the year was then read by M. W. Huber. The *grande médaille d'or* had been awarded to M. Savorgnan de Brazza, for his expedition to the upper course of the Ogowé, the Alima, and the Licona, in the course of which great dangers and privations had been surmounted by the leader and his devoted companions, Dr. Ballay and M. Hamon. The greater part of the cost of the undertaking had been defrayed by the leader himself. The medal was presented to Dr. Ballay in the absence of M. de Brazza, who was staying in Italy for the re-establishment of his health.—The *médaille d'or* had been decreed to Lieutenant L. N. B. Wyse, of the French navy, for his explorations in the Isthmus of Darien. M. Wyse had been engaged since 1868 in personally examining, on the spot, the various routes for an interoceanic canal, especially two lines traversing the States of Cauca and Panama in Southern Darien. The first line touches the Atlantic at the bottom of the Gulf of Uraba, the second at the harbour of Acantí near the entrance to the same gulf; both terminating on the Pacific at Darien Harbour in the Gulf of St. Miguel. The one line would require twenty-two locks, the other a tunnel $10\frac{1}{2}$ miles long; but both lines are remarkable for the magnificent ports that could be founded at both ends, for the healthiness of the region they traverse and the softness of the tertiary rocks in which the cuttings would be made.—Another gold medal (the Roquette prize) was awarded to Captain Sir George Nares, R.N., for the Polar Expedition of 1875-6, in which the latitude $82^{\circ} 24' N.$ was reached by one of the vessels—the highest yet attained by a ship—and Lieutenant Aldrich and Captains Rawson and Markham executed long surveys by sledge, the last mentioned surpassing the feat of Parry in reaching the high latitude of $83^{\circ} 20'$. The definition of the Palæocrystic Sea was also mentioned as one of the remarkable results of this voyage.—A paper was read by Commandant F. Perrier on the determination of longitudes by telegraph. Vice-Admiral De la Roncière le Noury was elected President for 1879-80, and Commandant Perrier and M. G. Perin, Vice-Presidents.

May 2: M. DAUBRÉE in the Chair.—The French missionaries in Tibet, who gave Captain Gill, R.E., so cordial a reception, sent an itinerary of Mgr. Félix Biet, Bishop of Tibet, from Ta-tsien-lu to Chen-tu-fu, capital of Sze-chuen, with indications by pedometer of the distances walked. Numerous communications were read from various Societies.—M. PERIN, Vice-President, communicated recent intelligence he had received from the Expedition of the Abbé Debaise, in Central Africa. According to accounts received from him, dated April 4th, 180 men of his escort had deserted, out of the 600 he had taken with him. As an excuse for their flight the deserters had spread most injurious reports concerning the state of the Expedition,—reports which appear to have little foundation, inasmuch as the men had brought with them neither their arms nor their baggage, a fact which speaks well for the watchfulness and discipline maintained in camp when the runaways took to flight. Previous accounts stated that the Abbé, on the 27th of February, was at Simba, eight stages from Ujiji.—A letter was read from M. de Semellé, the Niger traveller, written at Yuamaché on the Benué, on the 15th February, 1879. He reports having explored the Niger from Onitcha to Bussa, and surveyed the course of the Benué as far as Oku (?). He will bring with him a letter from Ahmru, Sultan of Nupé, who opens his territory to the French, assuring them of his aid and protection, and the privilege

of establishing trading stations. The letter is accompanied by presents for the President of the Republic.—A discussion ensued on the great question of the day, viz. the Inter-oceanic Canal of America, in which M. Wiener expressed his conviction that the Panama line would be the one adopted, and he strongly recommended the Company about to be formed, to avail themselves of Brazilian negro labour for the excavations. M. Levy, who had twenty years' experience of industrial works in Central America, gave a discouraging picture of the difficulties to be encountered, but showed his preference for the Nicaragua route. Both orators illustrated their descriptions by camera views illuminated on a screen, and declared the popular belief of the insalubrity of these regions to be exaggerated. The two routes for the canal most in favour now were declared to be that of Panama (by the Mamoni) and that of Nicaragua (by the San Juan).

Imperial Geographical Society of St. Petersburg.—March 22nd: Professor LENZ in the Chair.—Colonel Petrusévitch delivered a lecture on the old channels of the Oxus. He had conducted, during the years 1876 and 1877, an expedition to take levels in the desiccated river-bed, assisted by M. Helmann, an engineer, and two topographers. The object of this expedition was to ascertain the possibility of diverting the Oxus into its old bed debouching in the Caspian, and for this purpose it was necessary to take a series of levellings in order to determine the exact slope. The party started from Tiflis in July 1876, and continued their labours during the end of that year down to November 1877, by which time they had completed the survey as far as Lake Sari-Kamish, when war was declared with Turkey, and they were recalled; not, however, before they had determined beyond all doubt the possibility of flooding the dry river-bed, at all events to the point where they left off. Incidentally to the main object of the survey, they turned their attention to scientific questions connected with the Oxus river-bed. Thus they found that the theory of a geological upheaval as an explanation of so remarkable a phenomenon as that of such a great river changing its course was unsound, the facts brought to their notice plainly controverting it. Their work unfortunately could not be continued down to the Caspian. Colonel Petrusévitch also exhibited to the Meeting large-scale maps of the Oxus river from Charjui, in the Khanat of Bokhara, to the Aral. After his lecture, which was delivered almost without the assistance of notes, and listened to with marked attention, an interesting discussion followed, in which Professors Lenz and Mushketof and Baron Kaulbars took part. In the course of this discussion, reference was made to the recent overflow of the Oxus, and the additional confirmation thus lent to expectations of realising the scheme of a grand waterway from the heart of European Russia to the markets of Central Asia.—[It is reported that this subject is seriously engaging the attention of the Russian Government, and that a committee, presided over by Admiral Possiet, is now sitting upon it.]

23rd April: M. P. de SEMENOF, Vice-President, in the Chair.—It was announced that M. Sibiriakof, in addition to the despatch of a ship at his own expense via Behring Strait, is sending two sledge expeditions to the aid of Professor Nordenskiöld; one will start from Nijni Kolimsk, and the other from the mouths of the River Anadyr, and their task will be to explore every little bay on the Tchuktche coast, in hopes of quickly meeting some of Nordenskiöld's party, and communicating the information that further succour is on the way.—It was next stated that Prince Gédroicz, known for his geological acquirements, had been appointed by the Council to take part in the Government Expedition organised to explore the Uzboi, or ancient bed of the Oxus. The Society would participate in the same exploration independently, by sending M. Maief as their delegate in the private expedition organised at Samara, the object of which is to study the route for a railway from Orenburg to

Tashkend, as well as the capabilities of the Oxus for navigation. M. Maief is instructed to obtain the most complete data possible regarding the economic condition of the region, its products, and its needs, and also to examine the ruins of the ancient towns, which bear witness to the former prosperity of the country.

NEW BOOKS.

(By E. C. RYE, *Librarian* R.G.S.)

EUROPE.

Adriatic Sea.—Physikalische Untersuchungen in der Adria, dargestellt in vier Berichten an die königl. ungarische Seebehörde zu Fiume. Wien (Carl Gerold's Sohn): 1879, 8vo., pp. 16, map, 2 pls. (*Artaria & Co., Vienna.*)

This extract from the 'Mittheilungen aus dem Gebiete des Seewesens,' published by the Imp. Royal Hydrographic Office, Marine Library, Pola, consists of a recapitulation of the results of four expeditions, undertaken for physical researches in the Adriatic, of which the details are contained in four reports to the Royal Hungarian Marine Board at Fiume. The first of these reports, by Professors J. Wolf and J. Luksch (Fiume: 1877, large 8vo., pp. 55, 4 pls.), contains an account of the preliminary expedition by Professor E. Stahlberger and the authors in the *Nautilus* steamer, in 1874; the second (1877, pp. 27, 3 pls.), third (1878, pp. 41, 4 pls.), and fourth (1878, pp. 39, 5 pls.), are by the same authors, and Dr. J. Köttstorfer, and discuss the investigations in 1875, 1876, and 1877, in the *Deli* and *Nautilus*. They contain a great number of observations on temperatures, currents, gravity, and salinity, with appendices of chemical analysis.

Metz.—Erster Jahresbericht des Vereins für Erdkunde zu Metz, pro 1878. Metz (Scriba): 1879, 8vo., pp. 126, 3 maps.

This first annual publication of the recently founded Geographical Society of Metz, under the presidency of Herr Janke (Secretary, Lieutenant Kollm), contains besides the Rules, List of Members (mostly military), and accounts of the proceedings at meetings, the following papers:—(1) by the President, on Tunis and Carthage, with 2 maps; (2) by Captain Schultzen, on the ancient Roman water conduits from Gorze to Metz, with map; (3) by P. Karcher, on the abbey and city of Gorze; (4) by Dr. Hornburg, on the definition of Arabia, considered under its natural conditions; (5) by Lieutenant Janke, on the voyage of the German ship *Vineta* through the Straits of Magellau; and (6) by Dr. Müller, on the ruins of the Castle of Vianden in the Grand Duchy of Luxemburg.

ASIA.

Bezaure, Gaston de.—Le Fleuve Bleu. Voyage dans la Chine Occidentale. Paris (Plon): 1879, 16mo., pp. 312, map, pls. (*Dulau.*)

The author followed the ordinary steamboat route from Shanghai to Hankow, whence he proceeded to Chungking, an important commercial emporium in Szechuen, of which he describes the capital, Chêngtu. The map shows the course of the Min-kiang river, a northern affluent of the Kin-cha-kiang (upper waters of the Yangtse-kiang).

Dutreuil de Rhins, J. L.—Le Royaume d'Annam et les Annamites. Journal de Voyage. Paris (Plon): 1879, 16mo., pp. 315, maps, pls. (*Dulau.*)

The author was appointed in 1876 captain of the *Scorpion*, one of the war ships presented to the King of Annam by the French Republic. His headquarters were at Tourane, from which point he visited Hué and various places in its neighbourhood. The plates are from his sketches, and one of the maps, of the Province of Hué or Kouang Duc, is also to a great extent original (the other being a mere general one of the whole region). Many particulars are given of the daily life of the Annamites, with their ceremonials, and other occurrences of interest.

Kouropatkine, — Les Confins Anglo-Russes dans l'Asie Centrale. Étude historique, géographique, politique et militaire sur la Kachgarie (Turkestan Oriental). Traduite par G. Le Marchand. Paris (Dumaine): 1879, 12mo., pp. 189. (*Barthés & Lovell.*)

One of the "Publications de la Réunion des Officiers," the translator being a captain of artillery. Colonel (then Captain) Kuropatkin was military attaché to the last Russian embassy to Yakoub Beg, and his details are chiefly professional.

Rochechouart, Ct. Julien de.—Les Indes, La Birmanie, La Malaisie, Le Japon, et les États-Unis. Paris (Plon): 1879, 12mo., pp. 282, pls. (*Williams & Norgate.*)

This volume of Plon's series "Excursions autour du Monde" recounts the author's experiences at some time between 1867 and 1876, with an interval of two years spent in China, of which he has already published an account, noticed in our current 'Proceedings,' p. 148. As before, no index is given, and the work appears to be of no geographical importance.

Ujfalvy de Mezö-Kövesd, C. E. de.—(Expédition Scientifique Française en Russie, en Sibérie et dans le Turkestan. Volume II.) Le Syr-Daria, Le Zérafchâne, Les pays des Sept-rivières et La Sibérie-occidentale, avec quatre appendices. Paris (Leroux): 1879, large 8vo., pp. 208, pls., map, tables. (*Williams & Norgate.*)

A continuation of the work referred to in the present vol., p. 77, describing the governments of the Syr-Daria, Zarafshan, Sémirétché or Seven-rivers, and Western Siberia. A general account (geographical and political) is given of each of these, with special attention to their roads or other means of communication, and to their people, the author's primary objects being anthropological and ethnological. Any monuments, ruins, or other archaeological remains are carefully studied; but the chief attention is given to mensuration of individuals of the various tribes. The appendices contain archaeological observations on Turkistan and Western Siberia; observations on the Eranians of Central Asia; an essay towards an ethnographical map of Central Asia (with a map showing the distribution of races in the Pamir region); and a discussion of Baber's geographical names. Much other linguistic material is given in the work, which is somewhat disjointed. A third volume, on the country of the Bashkirs, the Northern Chudi, and the Altaic antiquities in Russia and Siberia, is in the press; and with three atlases of anthropological and archaeological subjects, will complete the series.

AFRICA.

Bérenger-Féraud, L. J. B.—Les Peuplades de la Sénégalie. Histoire, Ethnographie, Mœurs et Coutumes, Légendes, &c. Paris (Leroux): 1879, large 8vo., pp. 420. (*Williams & Norgate.*)

The author's position as naval surgeon in the French West African Colonies has enabled him to accumulate much valuable and interesting material with regard to the distribution, origin, habits, &c., of the Wolofs, Mandingos, Bambaras, and other Senegambian races.

Brugsch Bey, Henri.—Dictionnaire Géographique de l'Ancienne Égypte. Leipzig (Hinrichs): 1879, fo. (*Dulau.*)

An autographic work, to be completed in November next, in 13 livraisons of 1071 pages, containing in alphabetical order the comparative nomenclature of geographical proper names occurring on monuments and papyri, especially those of the governments and their head-centres, temples, sanctuaries, cities, towns, and burial-places, the seaboard, the Nile and its mouths, lakes, marshes, canals, basins, and harbours, valleys, grottos, mountains, and islands. One part, "La Géographie des Nomes, ou Division Administrative de la Haute et de la Basse Égypte aux Époques des Pharaons, des Ptolémées et des Empereurs Romains," has already appeared, as a specimen. The autographic process employed permits the use of rough hieroglyphies in the text.

Galiano, Pelayo Alcalá.—Memoria sobre Santa Cruz de Mar Pequeña y las Pesquerías en la Costa Noroeste de Africa. Madrid (Fortanet): 1879, 8vo., pp. 79, 3 maps.

Captain Galiano originally published his dissertation upon the position of the Castle of Guader, Santa Cruz de Mer pequeña (Mer chica or Mer menor), and its connection with the history of the conquest of the Canaries, in the 'Revista general de Marina' for last August; but his conclusions having been questioned by C. F. Duro in the Boletín of the Madrid Geographical Society, he reprints his treatise with additions. The dispute is purely historic, but the work may prove of some interest to those concerned either for or against the "El Juf" scheme of inundating the Sahara from Cape Bojador, as the area discussed is in the immediate vicinity. The maps show the positions assigned to Santa Cruz at different periods, the author placing it at the mouth of the Chibica, 11° 30' W. long., between Cape Nun and Cape Juby. Some sectional profiles of the coast are given.

Tromp, T. M.—Herinneringen uit Zuid-Afrika ten tijde der Annexatie van der Transvaal. Leiden (Brill): 1879, sm. 8vo., pp. 379, map.

The author was private Secretary to President Burger, and had official opportunities, at the time of the annexation of the Transvaal, for becoming acquainted with the actual condition of the country, and especially of the Boers, including their language, habits, religion, home life, &c. His route was from Natal by Maritzburg, Ladysmith, and Newcastle, to Wakkerstroom in the Transvaal; then to Pretoria and the south-west, visiting Griqua Land, and returning across the Orange Free State, *via* Aliwal to Port Elizabeth. The map is made up from Petermann, Merenskij, &c. The work is to be translated for this country.

AMERICA.

California.—Eine Blume aus dem Goldenen Lande, oder Los Angeles. Prag (Mercy): 1878, 12mo., pp. 257, pls.

Another addition to the descriptive series of works published anonymously by the Grand Duke of Tuscany, and which owe their chief value to the eminent artistic ability of their royal author. The illustrations from nature by him are of unusual merit, and include many physical features. The personal experiences were in 1876; considerable attention has been given to the economic products and capabilities of the country.

D'Ursel, Le Cte. C.—Sud-Amérique; Séjours et Voyages au Brésil, à La Plata, au Chili, en Bolivie, et au Pérou. Paris (Plon): 1879, 16mo., pp. 307, map, pls. (*Dulau.*)

The author, a Secretary of Legation, visited South America in 1873. His travels were confined to coasting, from Rio Janeiro, through Magellan Straits, and north to Venezuela. Some slight excursions were made inland, at Rio, Montevideo, and La Paz. The illustrations are characteristic.

Lefroy, Lieut.-General Sir J. H.—Memorials of the Discovery and Early Settlement of the Bermudas, or Somers Islands, 1511-1687, compiled from the Colonial Records, and other original sources. Vol. II. 1650-1687. London (Longmans): 1879, large 8vo., pp. xix. and 760, pls., map.

Completes the work (vol. i. was published in 1877), which is perfected by a double index, referring to both persons and subjects. Appendix XV., referring to Norwood's survey of 1663, has a special index, and is illustrated by a map reduced from that survey, compared with a reduction of the Admiralty chart of 1874, from which it varies in a very small degree.

Murphy, J. M.—Rambles in North-Western America, from the Pacific Ocean to the Rocky Mountains. London (Chapman and Hall): 1879, 8vo., pp. 364. Map.

This professes to be a description of the Physical Geography, climate, soil, productions, industrial and commercial resources, scenery, population, educa-

tional institutions, arboreal botany, and game animals of Oregon, Washington Territory, Idaho, Montana, Utah, and Wyoming,—a somewhat comprehensive title, scarcely justified by the contents of the book, which describes such salient features of those subjects as came under the author's observation (no dates given) during his journey, for the most part on the usual routes, in these states and territories, especially in Western Oregon. The accounts of the Fauna and Flora are apparently somewhat exaggerated. An ethnological chapter discusses "the Flathead Indians," a term incapable of definite application to any of the recognised tribes. Of these, a full account by G. Gibbs will be found in Part ii. of 'Contributions to North American Ethnology,' vol. i., issued as part of the results of Powell's U. S. Geographical and Geological Survey of the Rocky Mountain Region (Washington: 1877).

Wyse, L. N.-B., Reclus, A., and Sosa, P.—(Canal Interocéanique, 1877-1878.) *Rapports sur les Études de la Commission Internationale d'Exploration de l'Isthme Américain.* Paris (Lahure): 1879, 4to, pp. 294, 2 maps with profiles, and synoptical table.

Lieutenant Wyse's Report, after a summary of the earlier work of the Commission (fully detailed in his Report for 1876-77, published in the latter year by Chaix, Paris), and a succinct account of the results of his continued explorations, contains an estimate of the costs of the different projects submitted by the International Commission of 1876-78, and a comparison of the seven routes proposed for examination and selection by the international congress or scientific "Grand Jury," with M. F. de Lesseps as President, whose sittings have recently been reported in the daily newspapers. These routes, starting from the south, may be thus briefly discussed:—(1) By the Atrato, the Napipi, and the Doguado, starting in the Atlantic at the bottom of the Gulf of Darien or Uraba, and reaching the Pacific in the bight of Chiri-Chiri, with a total length (from deep water to deep water) of 181 English miles, a canal of 31 miles, 22 locks, and $\frac{1}{2}$ miles of tunnel. The probable duration of this would be 9 years, at an original outlay of 20,625,000*l.* and annual cost of 412,500*l.* (2) By the Atrato and its first chief affluent on the left bank, the Caacario or Caquirri, and the Tuyra, starting as in No. 1, and reaching the Pacific in Darien Harbour, San Miguel Bay; 147 miles long, with a canal of 80 miles, 22 locks, and no tunnel, or one not much over half a mile in length; to last 12 years, at an outlay of 27,083,333*l.*, and annual cost of 618,750*l.* (3) From Acanti (Gandi or Tolo), at the mouth of the Uraba Gulf, up the Estoli, through the Spiritu Santo range to the Tupisa (Selridge's Arquiat), then following the Chueanaque and the Tuyra, and having the same Pacific terminus as No. 2; 78 miles long, with a canal of 46 miles, no locks, but over 10 miles of tunnelage; to last 12 years, outlay 25,000,000*l.*, annual cost 250,000*l.* (4) By the Nerealagua, the Mamoni, and the Bayano; Atlantic end in the Gulf of San Blas, Pacific terminus in Chepillo Roadstead, Bay of Panama; 33 miles long, with canal of over 26 miles, no locks, 10 miles of tunnel; to last 10 years, outlay nearly 20,000,000*l.*, annual cost 166,666*l.* (5) By Chagres, leaving the Atlantic in Navy Bay, and ending in Panama Roads; 45 miles, all canal, no tunnel, but 25 locks; to last 6 years, outlay 208,750*l.* more than No. 4, annual cost same as No. 1. (6) By Chagres and the Rio Grande, with the same commencement and end as No. 5, about 2 miles longer, and also all canal, with no locks, but about 4 miles of tunnel; to last 6 years, outlay same as No. 4, annual cost 208,750*l.* Lastly (7), in Nicaragua and Costa Rica (all the preceding being in Colombian territory), by the San Juan, Lake Nicaragua, and the Rio Grande, starting from Greytown, and ending in Brito Roadstead, 182 miles long, with about 122 miles of canal, 21 locks, no tunnel; to last 10 years, outlay 21,875,000*l.*, annual cost 618,750*l.*

It will be observed that these projects do not include that of M. Lucien de Puydt, who claims to be an earlier explorer of these routes, and who, according to a pamphlet recently received by the Society from Paris, advocates a canal "from the Puerto Escondido del Sur, by the rivers Turgandi and Tanela, through the Paya Pass, and down the rivers Pucro and Tuyra, to the Gulf of San Miguel," for which a canal 55 miles long, with no tunnels or locks, and costing 16,000,000*l.*, would be required. This scheme is not intelligible without

more detail, and is possibly not given correctly, as the mouth of the Tanela is stated to be on the east coast of the Gulf of Darien, instead of the west.

After a notice of the chief advantages of and objections to the seven routes specified, Lieutenant Wyse gives the preference to No. 6, which is illustrated in detail on one of his maps (scale 1:200,000). This starts in Lemon Bay, below Aspinwall (Colon), and follows the Panama railroad on its western side up the valley of the Chagres River, crossing the rail to its eastern side at San Pablo; at Matachin, a little south of Cruces, it follows the River Obispo and the rail on their eastern sides, entering the Sierra de Culebra by tunnel at Obispo station, and emerging on the Rio Grande above Paraiso station, when it once more runs on the western side of the rail, being carried into Panama Roadstead as far as the little group of islands known as Naos, Culebra, &c. The only stated objections to this route are the torrential character of the waters of the upper Chagres and the tenacity of the rocks. Its advantages are that it is through an inhabited region, near a railroad all the way, and passing towns capable of supply; and the slight elevation (285 feet) of its divide, which, considering the shortness of the requisite tunnel, admits of rapid perforation. It shares, with Nos. 1-5, the advantage of having a concession, granted by the Colombian Government, which the Nicaraguan route (No. 7) has yet to obtain from the authorities of Nicaragua and Costa Rica; and financial arrangements are now stated to have been made with the Panama Railroad Company. The Nicaraguan route is, on the other hand, strongly urged by MM. J. Pouchet and G. Sauterau, Civil Engineers, in their 'Notes et Documents' (Paris, Déné: 1879, 4to., pp. 94, tables) presented to the Congress in support of M. A.-P. Blanchet's project. According to these notes, Lieutenant Wyse's No. 6 route is liable to strong objections from the oceanic calms prevailing at its outlets, rendering sailing-ship traffic difficult; the height of the tides on the Pacific terminus; its situation in the zone of greatest heat and rainfall, and of worst repute for its effect on health; its great want of population; its rocks being the hardest of the Isthmus; and its want of a port at each end. It is also opposed on account of the considerable subsidy to be paid to the Panama Railway Company, and of its wanting a treaty guaranteeing protection to strange nations. The Nicaraguan route is considered preferable on account of its passing through the most populous part of the Isthmus; its navigable waterway capable of taking a regular steam service; unlimited hydraulic power, easily cleared earth, neutrality and protection under various specified treaties, &c.

Route No. 4 (San Blas to Chepillo) is also illustrated on a map of the same scale as No. 6, and is apparently considered the second in feasibility. Further explorations, however, of the Bayano River, and its western affluents above Jesus Maria, would seem necessary before a definite secondary position is ascribed to this route. A small inset map (scale 1:50,000) gives details of the ancient and present mouths of the Acanti or Tolo river.

M. Armand Reclus, who appears to have had the chief practical share in the operations of the Commission, gives an account of the daily work in 1877-78, with a study in detail of the project of an Inter-oceanic Canal, in which the physical conditions of the Isthmus are discussed. Of the proposed plans, he also prefers No. 6, on account of the valley of the Chagres being lower, wider, and less sinuous than those of the Caño Quebrado or its affluents; the dividing ridge of the Obispo being the lowest in the whole Isthmus; the proximity to the rail; the slightness of the gradients, and minimum of tunnel and sub-oceanic working. The report of the engineer M. P. J. Sosa is in favour of routes Nos. 6 and 4, and he apparently himself, from a professional point of view, prefers the latter.

AUSTRALIA.

Bérengier, Le R. P. Dom Théophile.—*La Nouvelle-Nursie, Histoire d'une Colonie Benedictine dans l'Australie Occidentale (1846-1878).* Paris (Lecoffre): 1879, 8vo., pp. 385, map, woodcuts. (*Barthés & Lovell.*)

After a general description of the Australian Colonies, and a detailed history of the establishment and progress of the Benedictine Mission of Nouvelle Nursie, situated on the Moore River, north of Perth, an ethnological, zoological, botanical, and geological account is given of West Australia, with philological notes on idioms, and a vocabulary.

ARCTIC.

Diego, E. Contreras de.—*Viajes y Descubrimientos en el Polo Norte.* Madrid (Labajos): 1879, 12mo., pp. 256.

A general historical account of the chief Arctic voyages.

Toeppen, H.—*Die Doppelinsel Nowaja Semlja. Geschichte ihrer Entdeckung.* Leipzig (Mutze): 1879, 8vo., pp. 118, map. (*Asher.*)

After a chronological account of the various travellers who have visited the island, including Professor Nordenskiöld in the *Vega*, a general physical and topographical description of it is given (with special reference to the question of its being a continuation of the Ural chain), followed by particulars as to climate, flora, and fauna, and observations on its political and economic value. The map is roughly executed, on the scale of 1:1,700,000.

GENERAL.

Günther, S.—*Studien zur Geschichte der mathematischen und physikalischen Geographie.* Halle a. S. (Nebert): 1879, 8vo., pp. 407, woodcuts. (*Williams & Norgate.*)

A collection of memoirs on (1) the knowledge of the earth's rotundity and motion possessed by Western nations, Arabs, and Hebrews, in the Middle Ages; (2) ancient and modern theories on the periodical displacement of the earth's centre of gravity by great bodies of water; (3) analysis of cosmographical MSS. in the Munich State Library; (4) Johann Werner, of Nürnberg, and his references to mathematical and physical geography; and (5) History of the loxodromic or rhomboid curve.

Hahn, F. G.—*Untersuchungen über das Aufsteigen und Sinken der Küsten. Ein Beitrag zur allgemeinen Erdkunde.* Leipzig (Engelmann): 1879, 8vo., pp. 223. (*Dulau.*)

This treatise upon the secular movements of sea-coasts, after some general observations on the characteristics of upheaving and depressing agencies, discusses such local phenomena of either nature as have been recorded, with copious bibliographical notices, and general deductions.

Jomard, E.—*Introduction à l'Atlas des Monuments de la Géographie, par feu M. Jomard . . . publiée par les soins et avec des remarques de M. E. Cortambert.* Paris (Bertrand): 1879, 8vo., pp. 60.

This is an anticipatory separate publication of an article in the Bulletin of the French Geographical Society, and consists of general and historical remarks on maps, tables, &c., from the earliest known date, with special observations on the Egyptian, Grecian, Ptolemaic, and Roman epochs, and the middle-ages, as regards their map-productions; concluding with notes on the engraving and printing of maps. The original intention appears to have been that a detailed account should be published from Jomard's notes of each of the maps in his celebrated Atlas, but the death of D'Avezac, who undertook the work, has prevented its completion.

Krummel, Otto.—*Versuch einer vergleichenden Morphologie der Meeresräume.* Leipzig (Duncker & Humblot): 1879, 8vo., pp. 110, 24 tables.

This attempt at a comparative morphology of oceanic-spaces discusses the older divisions and nomenclature of seas; open oceans, mediterranean and bordering seas, as geographically generic terms; oceanic out-locks (not including the Dead Sea); methods of arranging the values of dimensions, &c., numerically; and the mid-depths of sea-spaces; with general conclusions.

Peschel, O.—*Physische Erdkunde. Nach den hinterlassenen Manuscripten Oscar Peschel's selbständig bearbeitet und herausgegeben von Gustav Leipoldt. Erste Lieferung.* Leipzig (Duncker & Humblot): 1879, 8vo., pp. 96, woodcuts. (*Williams & Norgate.*)

Reclus, Elisée.—Nouvelle Géographie Universelle. La Terre et les Hommes. Tome IV. L'Europe du Nord-Ouest (Belgique, Hollande, Îles Britanniques). Paris (Hachette): 1879, 4to, pp. 970, 6 coloured maps, 205 maps and plans in text, and 81 engravings.

The 244th livraison of the whole work (which is expected to occupy in all about 600 livraisons) completes the volume under notice, which specially recommends itself to British readers. It is on the same extended scale as its three predecessors (on Southern Europe, France, and Central Europe), comprising descriptions of all the chief physical features, national works, climatic conditions, and ethnological peculiarities of the countries discussed, with trade and other statistics, &c. The copious illustrations and maps, taken from official and trustworthy sources, add materially to the value of the work as one of reference; and in many cases give it almost the detailed utility of a gazetteer, in addition to its larger view.

Stanford's Compendium of Geography and Travel, based on Hellwald's 'Die Erde und ihre Völker.' AUSTRALASIA. Edited and extended by Alfred R. Wallace, F.R.G.S., &c., with Ethnological Appendix by A. H. Keane, M.A. London (Stanford): 1879, sq. 8vo, pp. 672, maps, pls.

But little more than one-tenth of this volume is to be ascribed to the German work on which the series is founded, and it may, therefore, be practically considered as new. It is a condensed and accurate summary of geographical information (in the widest sense of those words), on Australia, New Zealand, the Malay Archipelago, New Guinea and the other islands of Melanesia and Polynesia, and the Marshall, Pelew, and other Micronesian groups. Besides an index map, there are general and physical maps of Australasia, geological and general maps of Australia, and separate maps of N. S. Wales, Victoria, South and West Australia, Queensland, Tasmania, the Philippines, the Malay Archipelago, New Guinea and the Solomon Isles, New Caledonia and Samoa, the Society and Marquesas group, the Sandwich, Caroline, and Ladrone Islands, and New Zealand, North and South. Mr. Keane adds an appendix on the philology and ethnology of the inter-oceanic races, with comparative table of numerals, and list of races and languages.

As may be readily imagined from Mr. Wallace's former works, prominence is given to the natural history, physical conditions, and ethnology of the various islands discussed; and for various places of which he has no personal knowledge, the best and most recent authorities are quoted and acknowledged, with the result that accurate modern information on all essential points is readily accessible.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

FRENCH COLONIES.

Levasseur, E.—Possessions et colonies Françaises: carte dressée par E. Levasseur, membre de l'institut, avec le concours de MM. A. Dufresne et Lejeaux, dessinateurs géographes. Ch. Delagrave, Éditeur de la Société de géographie, Paris, 1879. Échelle de 1:1,000,000 or 13·6 geographical miles to an inch (une longueur de 1 millimètre représente 1 kilomètre). Font exception à l'échelle:—1° Le Planisphère donnant l'ensemble des possessions Françaises, dressé à l'échelle de 1:100,000,000 or 1369 geographical miles to an inch; le carton des Antilles au 1:20,000,000 or 273·8 geographical miles to an inch. 2° L'Inde dressée à l'échelle de 1:20,000,000 or 273·8 geographical miles to an inch. 3° Les environs des chefs-lieux de colonies dressés à l'échelle de 1:200,000 or 2·7 geographical

miles to an inch. 4° Les trois cartes détaillées de la Martinique, de la Guadeloupe et de la Réunion, dressées à l'échelle de 1:500,000 or 6·8 geographical miles to an inch. (*Dulan.*)

EUROPE.

Friedrich, L.—Post und Eisenbahn-karte von Deutschland, den Niederlanden, Belgien, und der Schweiz, bearbeitet nach L. Friedrich's Post- Eisenbahn- und Reise-karte von Mittel-Europa. Scale 1:1,800,000 or 24·6 geographical miles to an inch. Justus Perthes, Gotha, 1879. (*Dulan.*)

Orell, Füssli, and Co.—General-Karte der Gotthard-Bahn nebst Längenprofilen. Project von 1878. 7 Blatt. Maasstab der Gencralkarte 1:100,000 or 1·3 geographical miles to an inch. Maasstab der Längenprofile: für die Längen 1:100,000 or 1·3 geographical mile to an inch, für die Höhen 1:5000 or 14·6 inches to one geographical mile. Zürich, Orell, Füssli, & Co., 1879. (*Williams & Norgate.*)

ORDNANCE SURVEY MAPS.

1-inch General Maps:—

ENGLAND: No. 285, "hills shaded."

IRELAND: No. 106, "hills shaded."

6-inch—County Maps:—

ENGLAND: Middlesex, No. 22; Sussex, Nos. 16, 17, 75 and 76 (on one).

SCOTLAND: Argyll, Nos. 66, 67; Sutherland, Nos. 73, 79, 83, 88, 92, 97, 101, 105, 100, 107, 76, 84, 89, 93, 94, 95, 98 and 99 (on one), 103, 108, 109, 90, 110, 77, 86, 87, 96, 102.

IRELAND: Westmeath, No. 24 (revised).

25-inch—Parish Maps:—

ENGLAND AND WALES:—Berkshire: Shellingford, 6 sheets; Bunham and ditto detached, 7 sheets; Sulhampstead Abbots and ditto (detached Nos. 2 and 3), 7 sheets; Sulhampstead Bannister, 5 sheets.—Oxfordshire: All Saints, Christchurch (formerly extra parochial), Holywell, St. Bartholomew (formerly extra parochial), St. Ebbe, St. John the Baptist, St. Martin, St. Mary Magdalen, St. Michael, St. Peter-in-the-East, and St. Peter-le-Bailey, 3 sheets.—Glamorgan: Flemington, 5 sheets; Highlight, 2 sheets.

Town Plans:—On the scales of 1:500 or 10·56 feet to a mile; 1:1056 or 5 feet to a mile; and 1:2500 or 25·344 inches to a mile.—Hemel Hempstead, 1:500, 11 sheets; Tring, 1:500, 5 sheets; Edinburgh, 1:1056, 25 and 37 (revised sheets). (*Stanford, agent.*)

GEOLOGICAL SURVEY MAPS.

Vertical Sections, Sheet 65, Pit Sections and Borings of the South Durham Coal-Field, drawn and arranged by Henry H. Howell, F.G.S. Sheet 66. Sections of the strata of the Cumberland Lead Mines (Alston District), drawn and arranged by David Burns, under the superintendence of Henry H. Howell, F.G.S., District Surveyor. Cumberland, 55, 63, 69; Durham, 53; Northumberland, 54; Yorkshire, 13, 21, 24, 202.—Memoirs of the Geological Survey.—The Geology of the N.W. part of Essex and the N.E. part of Herts, with parts of Cambridgeshire and Suffolk (explanation of sheet 47 of the 1-inch map of the Geological Survey of England and Wales), by W. Whitaker, B.A., F.G.S.; W. H. Penning, F.G.S.; W. H. Dalton, F.G.S., and F. J. Bennett, F.G.S. Royal 8vo., sewed.—87 N.W. The Geology of the neighbourhood of Wakefield and Pontefract, by A. H. Green, M.A., F.G.S., and R. Russell, C.E., F.G.S., 1879.—The Geology of the Yorkshire Coalfield, by A. H. Green, M.A., F.G.S.; R. Russell, C.E.; R. Daykins, M.A.; C. Ward; C. Fox Strangeways; W. H. Dalton, and T. V. Holmes. (*Stanford agent.*)

ASIA.

Allen, W. H.—The Russian Official Map of Central Asia, compiled in accordance with the discoveries and surveys of Russian Staff Officers, up to the close of the year 1877. Scale 1:3,419,840 or 46·8 geographical miles to an inch. (*W. H. Allen & Co., London.*)

This map is apparently a reduction of the Map of the Military Province of Turkestan, constructed by the Turkestan Military Topographical Department. The original, from which this map is taken, is a 12-sheet map, and when put together forms a map 54 by 73 inches; its large size, and the lettering being in Russian character, render it unfit for reference to the general reader; therefore the reduction of this map to a handy scale, with English lettering, will make it very acceptable to those who are interested in Central Asia.

Harmand, Dr. J.—Itinéraires entre Bassac, la Khon et Hué par le Docteur J. Harmand, Février-Août 1877. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Société de Géographie, Paris, 1879.

Hassenstein, B.—Hydrographische skizze der Ebene von Yedo. Auf Grundlage einer nach Knippings Aufnahmen u. nach japanischen Quellen bearbeiteten Spezialkarte von B. Hassenstein. Scale 1:1,200,000 or 16·3 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Justus Perthes, Gotha, 1879.

Indian Government Surveys.—Lower Provinces Revenue Survey. District Dinajpore (Dinagapore). Scale 1 mile to 1 inch.—Sheets Nos. 7, 9. Lower Provinces Revenue Survey. District Furreedpore (Furreehpore). Scale 1 mile to 1 inch.—Sheets Nos. 1, 2, 3, 5. Lower Provinces Revenue Survey. Index to the Sheets District Rungpore (Rungpore), on the scale of 1 inch to the mile. Scale of the Index 8 miles to 1 inch. Lower Provinces Revenue Survey. Index to the Sheets of the District Sonthal Purgunnahs (Pergunnahs), on the scale of 1 inch to the mile. Scale of the Index 6 miles to 1 inch. North-West Provinces Revenue Survey. District Hamirpur. Scale 1 mile to 1 inch.—Sheets Nos. 3, 4, 5, 6, 7, 8, 11, 12. Great Trigonometrical Survey of India. Kumaon (Kumaun) and British Garhwal. With Hills. Scale 1 mile to 1 inch.—Sheet No. 36. North-West Provinces—Oudh. District Baraich (Bahraich), 1862–71. Scale 4 miles to 1 inch. North-West Provinces—Oudh. District Kheree (Kheri), 1864–1868. Scale 4 miles to 1 inch. North-West Provinces—Oudh. District Partabgarh (Partabgarh), 1859–1864. Scale 4 miles to 1 inch. Great Trigonometrical Survey of India. Guzerat. 1875–76. Scale 2 inches to 1 mile.—Sheet 31. Section 1. Parts of Broach and Amod Talukas of Broach Collectorate, and of Choranda Mahal in Baroda. Section 2, Parts of Broach Taluka of Broach Collectorate, of Rajpipla, and of Choranda Mahal in Baroda. Great Trigonometrical Survey of India. Guzerat. 1875–76. Scale 1 inch to 1 mile.—Sheet 31, Parts of Broach District, of the Gaikwar's (Gaekwar's) territory, and of Rewa Kanta. (*Stanford, agent.*)

Intelligence Branch, Quartermaster-General's Department.—Map of Afghanistan, compiled under the direction of Major C. W. Wilson, C.B., R.E., for the Intelligence Branch, Quartermaster-General's Department, War Office; on 40 half sheets. Scale 1:500,000, or 7 geographical miles to an inch. Zincographed under the superintendence of Lieut.-Colonel C. P. Carey, R.E., at the Ordnance Survey Office, Southampton, Colonel A. C. Cooke, C.B., R.E., Director-General.—(*Stanford, agent.*)

This map, when completed, will (according to the index sheet) include all the country between the twenty-fourth and fortieth degrees of north latitude,

and the fifty-ninth and seventy-fourth degrees of east longitude. The following 21 half sheets have been issued:—2 N., 3 N., 1 S., 2 S., 3 S., 6 N., 7 N., 8 N., 9 N., 6 S., 7 S., 8 S., 9 S., 11 N., 12 N., 13 N., 14 N., 11 S., 12 S., 13 S., 14 S. The bill work is shaded with chalk, and the map is in all respects clear and distinct.

Lörcher, Rev. J. G.—Map of the Province of Canton, according to the map of “Kwong-Tung Tú shot,” by the Rev. J. G. Lörcher. Scale 1:586,000, or 8 geographical miles to an inch. Wurster, Randegger & Co., Winterthur, 1879. (*Stanford.*)

The coast-line of this map is taken from the English Admiralty Charts, and the details have been supplied by several Protestant missionaries. It is printed in colours, on prepared calico, in a remarkably clear manner, and, though in size 55 inches by 60, it folds up into a very small compass, and could not be easily torn.

Petermann's Geographische Mittheilungen.—Die fahrt des Russischen klippers „Wssadnik,” Lieutenant Onatzewitsch, August 1876. Uebersicht der bisherigen arktischen Forschungen Nordwestlich der Bering Strasse. Scale 1:3,400,000 or 46·5 geographical miles to an inch. Justus Perthes, Gotha, 1879.

This map shows the tracks of Wrangel, April 1823; Cook, August 1778; Rodgers, August 1855; and Long, August 1867.

Tschekanowski, A.—Die Hauptresultate von A. Tschekanowski's Forschungen in Nord-Sibirien im Gebiete der Flüsse Olenck, Lena, und Jana 1874–75. Scale 1:6,000,000 or 82 geographical miles to an inch. Petermann's ‘Geographische Mittheilungen,’ Jahrgang 1879, Tafel 6.

AFRICA.

Intelligence Branch, Quartermaster-General's Department.—Sketch of road from Fort Tenedos to Ekowe. Scale, 1:316,800 or 4·3 geographical miles to an inch.

Sketch of Ground about Ekowe. Scale 275 yards to an inch. Intelligence Branch, Quartermaster-General's Department, London, 1879. (*Stanford, agent.*)

Revised 18th of April, 1879, from Major Barrow's sketch of the 14th March, 1879.

CHARTS.

Admiralty.—Charts published by the Hydrographic Department, in March and April, 1879.

No.	Size.	Inches.	
1845	$\frac{DE}{2}$ m =	{ 0·9 1·2 }	Bay of Bengal:—Entrance to Maulmain (Salween) River, and Amherst Roadstead.
668	$\frac{DE}{2}$ m =	{ 1·0 }	Africa, east coast:—Lamu, Manda, and Patta bays and approaches.
1314	$\frac{DE}{2}$ m =	3·6	South America, west coast:—Valparaiso Bay.
852	DE m =	0·9	United States, east coast:—Sapelo Sound to St. Andrew Sound.
853	DE m =	0·9	United States, east coast:—St. Andrew Sound to St. John River.
1192	DE m =	0·5	England, east coast:—Hartlepool to St. Abbs Head.
288	$\frac{DE}{4}$ m =	3·0	Newfoundland, east coast:—Toulinguet Harbours.
661	$\frac{DE}{2}$ m =	0·9	Africa, east coast:—Kilwa Kisiwani (Quiloa).
1539	DE m =	7·0	Ireland, west coast:—River Shannon, Sheet VI.

Admiralty.—Index to Charts and Plans published by the Hydrographic Office of the Admiralty, under the superintendence of Captain F. J. Evans, R.N., C.B., F.R.S., Hydrographer, 1875. Corrected to 1879.

— Atlas of Wind and Current Charts for Pacific, Atlantic, and Indian Oceans. Compiled by Captain F. J. Evans, R.N., F.R.S., Hydrographer, and Staff Commander T. A. Hull, R.N. Published at the Hydrographic Department of the Admiralty, 1872. Republished with additions, 1879. (*Stanford, agent.*)

Dépôt des Cartes et Plans de la Marine.

No. 3619, Angleterre, Côte Est, Approches d'Harwich ; 3633, Plan de l'Embouchure de la Seine (environs du Havre) ; 3507, Carte particulière des Côtes de France, Baie de Douarnenez ; 3653, Mer Méditerranée, Côte S.E. d'Espagne, Plan du Port de Porman ; 3636, Mer Méditerranée, Côte S.E. d'Espagne, Plan de l'Anse de Morayra ; 3638, Îles Ioniennes, Baie de Zante ; 3605, Sicile, Port de Trapani ; 3568, Mer Adriatique, Côte Orientale, d'Antivari à l'entrée de la Riv^{re} Vojuzza ; 3552, Mer Adriatique, Côte Orientale, de l'île Meleda à Antivari ; 3617, Mer Adriatique, Canal de Pasman ; 3632, Mer Adriatique, Baie de Valona ; 3627, Mer Adriatique, Ports de Rogosnizza, de S. Giorgio di Tirona, Canal de Trau, Baies Saldon et Bossiljina ; 3621, Mer Adriatique, Canal dei Castelli, Port de Makarska, Rade d'Almissa, Port de Spalato ; 3620, Mer Adriatique, Port de S. Giovanni di Medua, Baie d'Antivari, Baie Durazzo ; 3591, Mer Adriatique, Îles et Passes devant Orsera, Port de Rovigno ; 3570, Mer Adriatique, Canal de Spalmadori, Ports Citta-Vecchia, Verboska, Gelsa (de l'île Lésina), et Oliveto (de l'île Solta) ; 3564, Mer Adriatique, Canal Maltempo et ses abords ; 3534, Mer Adriatique, Port de Trieste, et Baie de Muggia, Canal Lemo (Côtes d'Istrie) ; 3618, Mer Adriatique, Port de Gravosa, Port de Budua ; 3611, Mer Adriatique, Ports Quieto et Cittannova ; 3614, Mer de Chine, Croquis de la Baie Hancock dans l'île Oho-Sima entre le Japon et les Lou-tchou ; 3631, Mer de Chine, Plan du mouillage de la Baie est de Poulo Condore ; 3641, Côte N.E. de Cochinchine, Croquis de la Baie de Thuamoï ; 3547, Vues de la Côte de Cochinchine, 5^e Feuille ; 3548, Vues de la Côte de Cochinchine, 6^e Feuille ; 3626, Côte de Mantchourie, Baie Olga, Chenal Brown ; 3615, Japon (Côte Ouest de Nipon), Croquis du mouillage de Négata ; 3613, Tong-Kin, Croquis du mouillage de Voung-han ; 3643, Golfe du Tong-Kin, Croquis du mouillage de Chong-moon ; 3616, Golfe du Tong-kin, Croquis du mouillage de Pa-Kou et des Rivières de Lien-chau-fu et Kan-haï ; 3644, Golfe du Tong-Kin, Croquis de la Côte du Tong-Kin, entre la Cac-ba et le Cap Paklung ; 3640, Carte de la Côte d'Annam, entre Tourane et Hué ; 3612, Mer Rouge, Île de Perim ou Meyun, et petit détroit de Bab-el-Mandeb ; 3651, Égypte, Plan de la bouche de Damiette ; 3603, Baie de Tunis, Partie comprise entre le Cap Carthage et la Côte Sud ; 3602, Côte Septentrionale d'Afrique, Golfe de la Grande Syrte ; 3604, Côte Septentrionale d'Afrique, Partie comprise entre Tarzis et Tripoli ; 3601, Côte Septentrionale d'Afrique, Île de Djerba ; 3610, Côte Septentrionale d'Afrique, Plans de Ports et de mouillages de la Côte de Tunis et de Tripoli ; 3589, Côte Septentrionale d'Afrique, Plan du mouillage des Trois Écueils ; 3586, Côte Septentrionale d'Afrique, Plan du Port Chebec, Plan du Port de Brega (Grande Syrte) ; 3608, Côte Orientale d'Afrique, Plan de l'île de Chiloane ; 3634, Îles Canaries, Île Lanzarote, Ports de Naos et d'Arrecife ; 3514, Amérique Centrale, Côte Ouest, Golfe de Panama, de la Rivière San Juan à la Pointe Mariato ; 3623, Côte Ouest de l'Amérique du Sud (Chili), Caleta Matanza, Rade de Quintai, Rio Rapel ; 3572, Côte Est de Patagonie, Plan de la Baie de Cayetano et du Port St. Antoine ; 3609, Australie, Côte Est, Port Denison ; 3501, Australie, Golfe de St. Vincent, Port Adelaide ; 3594, Archipel de Tihiti, Côte Nord de Moorea, Baie de Cook ou de Paopao ; 3607, Océan Pacifique Sud, Île Rapa ; 3553, Océan Pacifique, Îles de la Société, Côte Est de Moorea ; 3606, Archipel des Marquises, Plan de la Baie des Vierges (Hanavave), Côte Ouest de l'île Fatu-hiva.

ATLASES.

Bartholomew, J.—Philip's Handy General Atlas of America, comprising a series of detailed maps of the United States, Canada, &c. With Index and Statistical Notes by John Bartholomew, F.R.G.S. London, 1879. (*G. Philip & Son.*)

This atlas contains Statistical Tables as to the area, population, capitals, population of the capitals, and most important towns, counties, and provinces of the Dominion of Canada, and the United States of America. There are 23 maps of North and South America and West Indies, including a map of the North Atlantic and Pacific Oceans, on which all existing submarine cables, mail and trade routes are laid down, together with their distances and the average length of the passages in days.

Bonnange, Ferdinand.—Atlas graphique et statistique du commerce de la France avec les pays étrangers pour les principales marchandises pendant les années 1859 à 1875, publié par ordre de M. Teisserenc de Bort, Sénateur, ministre de l'agriculture et du commerce, sous la direction de M. Ozenne, Conseiller d'État, secrétaire général, par Ferdinand Bonnange, archiviste du ministère. Ouvrage honoré d'un diplôme d'honneur à l'Exposition universelle de 1878. 56 planches in-plano accompagnées d'un texte et d'une table. 1879. (*Dulau.*)

Saint-Martin, M. Vivien de.—Atlas Universel de Géographie Moderne, Ancienne et du Moyen Age; construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux géodésiques, &c.; avec un texte analytique par M. Vivien de Saint-Martin, Président honoraire de la Société de Géographie de Paris, &c., &c. Environ 110 cartes gravées sur cuivre sous la direction de MM. E. Collin et Delaune. Hachette et Cie., Paris. (*Dulau.*)

This Atlas is published in numbers, each number containing 3 maps, accompanied with a notice of such documents as have been used in the construction of the maps. Only two numbers have as yet been published. The first contains:—Preface, explanatory notices, une Carte du Ciel, la Carte de la Turquie d'Europe, et la Carte de la Région Arctique. The second number contains:—Une Carte du Ciel, la Carte de la Suisse, et la Carte du Royaume de Grèce; together with explanatory notices. All the maps contained in these two numbers are finely engraved, but the map of Switzerland (which was exhibited at the late Exposition Universelle de Paris) is a splendid specimen of cartographic engraving. The Celestial maps are also worthy of special notice.

Spruner, Dr. K. v.—Hand-Atlas für die Geschichte des Mittelalters und der neueren Zeit. Dritte Auflage. Neu bearbeitet von Dr. Theodor Menke. 20 Lieferung. Gotha, Justus Perthes, 1878. (*Stanford.*)

The contents of the 20th part of Dr. K. v. Spruner's Hand-Atlas are as follows:—Vorbemerkungen, Seite 49. (No. 5) Europa: No. V. Europa zur Zeit des dritten Kreuzzuges, 1190. Mst. 1:15,000,000. Neu bearbeitet von Friedr. Keinz. (No. 68) Slawische Reiche: No. 11, Russland von der Verlegung des russischen Grossfürstenthums nach Moskau, 1328–1480. Mst. 1:12,000,000.—Nebenkarten: 1, Russland von der Zerstörung Kiëws durch Batu, 1240, bis zum Uebergang des Grossfürstenthums nach Moskau. Mst. 1:15,000,000.—2, Russland nach seinen kirchlichen Verhältnissen bis zum XVI. Jahrhundert. Mst. 1:15,000,000.—3, Esthland, Livland und Kurland nach ihren kirchlichen Verhältnissen im Mittelalter. Mst. 1:6,000,000.—4, Dieselben in den Jahren 1238–1346. Mst. 1:6,000,000.—5, Dieselben in den Jahren 1346–1480. Mst. 1:6,000,000.—6, Plan von Nowgorod im Mittelalter. Mst. 1:20,000. Von Prof. Dr. J. Caro. (No. 70) Slawische Reiche: No. IV. Russland, Polen und Litthauen vom Untergang des Freistaats Nowgorod, 1478, und von der Auflösung der goldenen Horde, 1480, bis auf Peter den Grossen, 1689. Mst. 1:12,000,000.—Nebenkarten: 1, Polen und Litthauen nach der Lubliner Union 1569 und dem Aussterben der Jagiellonen 1572. Mst. 1:12,000,000.—2, Moskowisch-Litthauisches Grenzgebiet. Mst. 1:6,000,000.—3, Russisches

Eroberungsgebiet in Sibirien. XVI. und XVII. Jahrhundert. Mst. 1:50,000,000.—4. Esthland, Livland und Kurland, 1480 bis 1682. Mst. 1:6,000,000.—5. Plan von Moskau. Mst. 1:200,000.—6. Der Kreml. Mst. 1:50,000. Von Prof. Dr. J. Caro. (No. 74) Ungarn: No. II. Ungarn in seinen kirchlichen Verhältnissen vom Anfang des XIV. Jahrhunderts bis zur Reformation. Mst. 1:3,700,000.—Nebenkarten: 1. Ungarns Diöcesen v. a. Stephan dem Heiligen bis auf Ladislaus den Heil. Mst. 1:7,400,000.—2. Ungarns Diöcesen im Anfang des XIII. Jahrhunderts. Mst. 1:7,400,000.—3. Diöcesis Jadrensis. Mst. 1:1,850,000.—4. Grenzgebiet von Zagrabiensis und Corbaviensis. Mst. 1:1,850,000.—5. Pannonien, kirchliche Verhältnisse bis 884. Mst. 1:15,000,000.—6. Pannonien, kirchliche Verhältnisse im X. Jahrhundert. Von Prof. Dr. J. Caro.

Stieler, Adolf.—Hand-Atlas über alle Theile der Erde. Neu bearbeitet von Dr. August Petermann, Dr. Hermann Berghaus, und Carl Vogel. Parts 2 and 3. Justus Perthes, Gotha, 1879. (*Stanford.*)

The contents of the second part of the new edition of Stieler's Hand-Atlas are as follows:—No. 24, Süd-West-Deutschland und die Schweiz, Nördl. Theil, von C. Vogel, 1:925,000. Cartons: Metz und Umgegend, 1:150,000; Strassburg und Umgegend, 1:150,000. No. 77, Polynesien und der Grosse Ocean. Östliches Blatt, von A. Petermann, 1:40,000,000. 17 Cartons: Inselgruppen in verschiedenen Maasstäben. No. 79, West-Indien, Blatt I., von A. Petermann, 1:7,500,000.

The contents of the third part of the new edition of Stieler's Hand-Atlas are as follows:—No. 43, Niederlande und Belgien, von C. Vogel, 1:1,110,000. Nebenkarte: Neue Festung Antwerpen, 1:400,000. No. 46, Grossbritannien. Südliches Blatt, von A. Petermann, 1:1,500,000. Nebenkarte: Die Canal-Inseln, 1:1,000,000. No. 80, West-Indien, Blatt II., von A. Petermann, 1:7,500,000. Nebenkarte: Die Atlantischen Staaten zwischen Washington und Boston, 1:1,500,000.

EDUCATIONAL.

Philip, G.—New Map of the County of Derby. Scale 1:90,000 or 1.2 geographical miles to an inch.—New Map of the County of Warwick. Scale 1:73,000 or 1 geographical mile to an inch. G. Philip & Son, London, 1879. (*Stanford.*)

Putzger, F. W.—Historischer Schul-Atlas zur alten, mittleren und neuen Geschichte in siebenundzwanzig Haupt- und achtundvierzig Nebenkarten. Ausgeführt in der Geographischen Anstalt von Velhagen & Klasing in Leipzig. Zweite, verbesserte Auflage. Velhagen & Klasing, Bielefeld und Leipzig, 1879. (*Dulau.*)

Andree, Dr. Richard.—Allgemeiner Volksschul-Atlas in fünfunddreissig Karten. (Ausgabe für Norddeutschland.) Ausgeführt von der Geographischen Anstalt von Velhagen & Klasing in Leipzig. Neue Bearbeitung von 1879. (*Dulau.*)

—Allgemeiner Volksschul-Atlas. (Ausgabe für Süddeutschland.) Ausgeführt von der Geographischen Anstalt von Velhagen & Klasing in Leipzig. Neue Bearbeitung von 1879. (*Dulau.*)

These three Atlases are all very good, the maps being clear and not overcrowded with names. The low price at which they are offered to the public is very remarkable; the price of the "Historischer Schul-Atlas," which contains 27 large and many inset maps and plans of ancient cities, is three shillings; of the "Volksschul-Atlas" (Ausgabe für Norddeutschland), which contains 35 good maps, one shilling; and of "Volksschul-Atlas" (Ausgabe für Süddeutschland), which contains 31 maps, also one shilling.

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Native Routes in East Africa, from Dar-es-Salaam towards
Lake Nyassa.* By KEITH JOHNSTON, Esq.*

(Read at the Evening Meeting, June 23rd, 1879.)

Map, p. 480.

I HAVE just (May 1st) returned from Dar-es-Salaam, where I have been collecting information about the country through which the expedition under my command is likely to pass, and have time to write only a hurried report by this mail.

Mr. Smith, the agent for the British India Company here, kindly placed his comfortable dhow at my disposal; but it required three days to beat down south to Dar-es-Salaam against the strong southerly wind. Chuma and three men accompanied me. At Dar-es-Salaam I found Mr. Beardall, whose work on the road is at a standstill for the present on account of the rains, and we spent the greater part of a day together in examining travelled natives as to the paths and countries inland: the results of these questionings are given further on.

From what I learned at Dar-es-Salaam, I resolved to go up the road as far as the village of Kola, 32 miles in the interior, to make inquiries there about a path to the south-west.

In the present state of the road, this journey required four days in going and returning, for great part of it is under water. But notwithstanding the inefficient manner in which the greater part has been constructed, I entertain hopes of this road becoming a great highway into Africa. The portion of it which lies through the low country will, I fear, be under water to some extent during every rainy season, but with deep ditching on each side much of it might be kept dry at all times. If the portion beyond this through the hills is reconstructed in the same substantial manner as the piece already completed by

* From information collected by Mr. Keith Johnston on a preliminary journey to the mainland, previous to the start of his expedition.

Mr. Beardall, there will be no great difficulty in keeping it clear of the rapidly growing weeds.

I was surprised at the amount of traffic along the path, even now, at the height of the rains, when little trade is going on: parties of six or seven Wazaramo carrying loads of provisions, &c., were met with frequently, and two small Unyamwezi caravans were passed, one going, the other returning. The Wazaramo working under Mr. Beardall prove willing and docile in the highest degree; he seems to have no trouble at all with them, and in some places they of their own accord have turned their road-making education to account by making smaller branch roads to the main one from their villages.

The direction of the road, in the last ten miles at least, is quite at fault, if the purpose of it be to reach Nyassa, for there it begins to descend by the Unyamwezi caravan path into the valley of the Kingani. This latter path may serve very well as a branch from the main road to lead in the Unyamwezi and Mpwapwa traffic, but the line of the chief highway should, I think, be turned along the higher ground between the Kingani and Lufigi valleys, and the best point at which to branch off seems to be the important village of Kola.

This brings us to the point of inquiring what sort of country and what tribes must be passed in seeking a way to the head of Nyassa?

At Dar-es-Salaam, with Mr. Beardall's assistance, the following information was elicited by patient cross-examination of several natives, our most intelligent informant being a man named Bwana Mji, who travels every year inland, trading on his own account, or with Arabs.

The most important country between Uzaramo and Ubena, in the direction of the head of Lake Nyassa, is that of M'henge, which lies between the main tributaries of the Lufigi, viz. the Ruaha, and Ranga, not far above their confluence. It is about five days' journey in extent, from east to west, and its most important town is that of Wipia or Vipia, the seat of Ungachero, the most powerful chief of M'henge. The people of this country are mainly the remnant of the Maviti or Zulus, who attacked Kilwa some years ago, and who were ultimately broken up by the Wagwangwaras. They seem to have settled down quietly, and to be a trading people. Many fragments of other tribes have become incorporated with these Maviti, or have "sat down at the feet of the chiefs of M'henge," as our informant expressed it. The M'henge people, in turn, have partly subjugated or driven out the Wahehe from the neighbourhood of the Lufigi and the Ruaha; some of these disturbed Wahehe are now settled in M'henge itself; others have formed isolated settlements in Marui, among the Wazaramo.

The most frequented route to M'henge from Dar-es-Salaam is a path which appears to strike nearly due southward along the maritime base of the coast hills, probably not very far inland from the route followed by Captain Elton in going to the Lufigi. It is described as a low and

wet path at all seasons, and to be impassable in the rains. Along this line there are six marches of a day each to reach the Lufigi, at a distance of two days' journey above the ferries at Mbenbeno or the head of the delta.

The halting-places are the villages of Mzugu, Liwela, Mkambe, Kisigesi, Kogi, and the Lufigi canoe ferry. Between Liwela and Mkambe a lake named Manzi is described as containing hippopotami, and a river named Mbezi, which reaches the sea in Chungu, is probably the outlet of this lake. Following this lower road, M'henge is reached either by a track which passes westward from the canoe ferry to another ford near the confluence of the tributaries, by passing along south of the Lufigi and the Ranga to a ford of the latter at a village named Matengi, which is only a day's march from the town of Vipia, or by leaving this southward road before reaching the Lufigi, and turning along a path which strikes west from between Kisigesi and Kogi.

A second route to M'henge is that which passes from the Dar-es-Salaam road, onward along the Unyamwezi caravan route by the valley of the Kingani, through Mzegero, Matamombo, Kidigela - Mahoro, Kidunda, Mgeta, Kiruru, Duthumi, and Shenakambi to Kisake, a town close to the now ruinous and abandoned Zungomero.

It will be noticed that this track strikes at once into that followed by Captain Burton, in his journey of 1857-58, and that it follows along it exactly as far as Kisake or Zungomero, whence that explorer's route continues westward. From Kisake the path to M'henge turns south-west to Cha Ulembo, and thence through forest or jungle for three days, the halting-places being the deserted villages of Mgunda and Vianzi (each a day apart), and so on to another canoe ferry across the Ruaha. On crossing the Ruaha by this route the Wahehe country is entered, the first halting-place from the river being the town of Kongawira, which is described as a very remarkable and very strong place, on the top of a very steep hill. Round the summit large stones are placed in readiness to hurl down at any approaching enemy. The next day's stage from Kongawira brings one into the country of M'henge, at a place named Msapa; Mayaruka, Tete, and the capital town of Vipia, are each a day's march further on. By this route Vipia would be reached in about twenty-one marches from Dar-es-Salaam.

The disadvantages of this northern path are that it is now almost "dead," though it was formerly frequented: large portions of it lie through deserted country, and a great part of it has already been explored.

As these two best known routes seemed to be unsuitable and round-about ways of reaching M'henge, our next inquiry was for a path leading between these two, somewhere along the water-parting of the Lufigi and Kingani basins. Such a track would have the advantages of being in a more direct line for any future extension of the Dar-es-Salaam road,

and of passing over higher and healthier ground than that of the river valleys. To our delight we found that such a path as we were in search of exists, though it is not used as a regular caravan route. Starting from Kola, 32 miles up the Dar-es-Salaam road, it will be possible to find a way by winding paths through the Wazaramo district of Marui. About two days' journey through Marui reaches the village of Mvulani, beyond which the district of Bogwa is distant a day's march: then follow three marches through jungle in which the halting-places are named Kiseto and Mzerakera. A day beyond this last station brings one to the Wakhutu village of Hupo, and another day's march reaches the important place named Berobero, the Mkhutu chief of which town is named Goha. Berobero is described as lying in a very mountainous district, the heights being occupied by tribes of Madenge and Wa-Lufigi. Two days through jungle from Berobero are required to reach an uninhabited ford of the Ruaha. The country beyond the Ruaha on this route is also deserted nearly as far as the Msoro, a small stream flowing south to join the Ranga, and forming the boundary of M'henge on the east. In this tract the two halting-places are the deserted villages named Dekero and Mahimbwa.

This Berobero route joins into that from Kisake at Msapa on the borders of M'henge. By this line Vipia could be reached in about eighteen days from Dar-es-Salaam; there are no considerable rivers on the way (excepting the Ruaha), and most of the path is over upland, or hilly ground.

At Kola I was glad to find that these accounts gathered at Dar-es-Salaam were confirmed in the main. The Kola people, however, are no travellers; very few of them had been to M'henge, and the chiefs accounted for this by saying that they had nothing whatever to exchange with these inland tribes. Another route to Bogwa was given me in Kola, but it seems to be longer than that formerly noted. It is as follows:—Kola. Mzegero; a night in the jungle; village of Sambwe; village of Mulungu; Bogwa.

Going westward from M'henge to Ubena the caravan track follows the left bank of the Ranga, at some distance from the river. From Vipia the first day's stage is to the deserted village of Dudumizi; the next night is spent at Matanga, a village inhabited by Wambunga; the third at the Walehe village of Ruholela. A day beyond Ruholela brings one to the frontier of the rich country of Ubena, where the "cattle are as numerous as the blades of grass."

The residence of the chief Mtengere in Ubena is described as being eight days' journey from Merere's town in Urori; if this is the case the supposed position of Mtengere's town, laid down in Captain Elton's map, is either at fault, or else the chief has more than one capital.

At Dar-es-Salaam I was also glad to find a man who knew something of the northern route from Kilwa Kivinja to Ubena, of which I

had been in search. It passes from Kilwa to the ford of the Ranga at Matengi (chief, Mlangolu), and traverses the districts of Mandando, Wande, Tete, and Hombero. The country on this line is inhabited by the Wangindo; the hills by a people called the Wakichi. The Wawande of the district of that name are described as nomads. The Wagwangwaras (who are said by our informant at Dar-es-Salaam to call themselves the Wamachonde, or Wamachote) live south of the Ranga, west of the Gindos, and towards Nyassa. The name Wandonde, which appears on some maps as that of a separate tribe, belongs to the inmost section of the Wangindo. An isolated tribe named the Waganga, occupies a mountain district south of the Ranga, nearly opposite to M'henge.

I may add here an itinerary of the middle caravan route from Kilwa to Ukena; I have not ventured to lay it down on the map even approximately as yet.

<i>Through</i>		Kilwa Kivinja to Chief Nampoma's ..	3 days	These numbers refer to the number of days actually spent on the journey in trading, not to the distances in day's marches between the places.
WANGINDO ..	{	Nampoma's to Wamakombe	2 "	
		Wamakombe to Nambuye	1 "	
		Nambuye to Kwanchimbuka	3 "	
		Kwanchimbuka to Unde	6 "	
WAGWANGWARA	{	Unde to Katumemwana's	6 "	
		Katumemwana's to Chikokota's	1 "	
		Chikokota's to Kwanjahani	1 "	
		Kwanjahani to Pangalala's (chieftainess)	1 "	
		Pangalala's to Rusapa's	1 "	
		Rusapa's to Dembo	1 "	
		Dembo to Kahindambuli	3 "	
MAVITI	{	Kahindambuli to River Ranga	1 "	
		Ranga to Kwawa	1 "	
		Kwawa to Mwenyemjinga's	5 "	
WABENA ..	{	Mwenyemjinga's to Mwenyemgumbi's ..	7 "	
		Mwenyemgumbi's to Unyakanyaka ..	17 "	
		Unyakanyaka to Wakinamtoa	20 "	
		Wakinamtoa to Nangwila	7 "	

The reasons which have decided me in fixing upon the middle one of the three lines leading to M'henge (that from Kola to Berobero), as that which will give the most useful field of exploration, will be understood from the notes given above. Everything here is now ready for a start. The loads are made up and numbered; the men, after being carefully weeded out, have been paid their first advance, and all are ready under Chuma's care. I think I mentioned in my last note to Mr. Bates that the contract with the men had been made in Dr. Kirk's presence: the money advanced to them in two instalments before starting amounts to four months' pay. This point took a long while to settle, but it was found impossible to get the men to go at all unless four months' wages were advanced to them. On the Unyamwezi

caravan route, which is well known, they would have been content with two or three months' advance.

For two reasons I have been obliged to decide to wait for still another fortnight in Zanzibar before starting. The first is that so much of the country behind Dar-es-Salaam is under water: the rains are expected to be over in about six days, but it will take another week to make the path passable. The second is that food is very scarce at present in the Wazaramo country; no rice or mtama is to be got on the road just now, but in about three weeks the rice of the growing crop will begin to come into market. As it is, we shall need to carry food for the first week; and the means of transporting food for the men along with us through the frequent deserted tracts that lie in the way, will also need to be provided. I purpose sending two men on to Bagamoyo a few days before we start, to buy five Unyamwezi donkeys, and to drive them down to Dar-es-Salaam. These, I hope, will carry all the food that will be necessary in crossing the deserted tracts.

Geographical Evolution. By PROFESSOR ARCHIBALD GEIKIE, F.R.S.

(A Lecture delivered at the Evening Meeting, March 24th, 1879.)

IN the quaint preface to his 'Navigations and Voyages of the English Nation,' Hakluyt calls geography and chronology "the sunne and moone, the right eye and the left of all history." The position thus claimed for geography three hundred years ago by the great English chronicler was not accorded by his successors, and has hardly been admitted even now. The functions of the geographer and the traveller, popularly assumed to be identical, have been supposed to consist in descriptions of foreign countries, their climate, productions, and inhabitants, bristling on the one hand with dry statistics, and relieved on the other by as copious an introduction as may be of stirring adventure and personal anecdote. There has, indeed, been much to justify this popular assumption. It was not until the key-note of its future progress was struck by Karl Ritter, within the present century, that geography advanced beyond the domain of travellers' tales and desultory observation into that of orderly, methodical, scientific progress. This branch of inquiry, however, is now no longer the pursuit of mere numerical statistics, nor the chronicle of marvellous and often questionable adventures by flood and fell. It seeks to present a luminous picture of the earth's surface, its various forms of configuration, its continents, islands, and oceans, its mountains, valleys, and plains, its rivers and lakes, its climates, plants, and animals. It thus endeavours to produce a picture which shall not be one of mere topographical detail. It ever looks for a connection between scattered facts, tries to ascertain the relations which subsist between the different parts of the globe, their reactions on each other and the function of each in the

general economy of the whole. Modern geography studies the distribution of vegetable and animal life over the earth's surface, with the action and reaction between it and the surrounding inorganic world. It traces how man, alike unconsciously and knowingly, has changed the face of nature, and how, on the other hand, the conditions of his geographical environment have moulded his own progress.

With these broad aims, geography comes frankly for assistance to many different branches of science. It does not, however, claim in any measure to occupy their domain. It brings to the consideration of their problems a central human interest, in which these sciences are sometimes apt to be deficient; for it demands first of all to know how the problems to be solved bear upon the position and history of man and of this marvellously ordered world wherein he finds himself undisputed lord. Geography freely borrows from meteorology, physics, chemistry, geology, zoology, and botany; but the debt is not all on one side. Save for the impetus derived from geographical research, many of these sciences would not be in their present advanced condition. They gain in vast augmentation of facts, and may cheerfully lend their aid in correlating these for geographical requirements.

In no respect does modern geography stand out more prominently than in the greater precision and fullness of its work. It has fitted out exploratory expeditions, and in so doing has been careful to see them provided with the instruments and apparatus necessary to enable them to contribute accurate and definite results. It has guided and fostered research, and has been eager to show a generous appreciation of the labours of those by whom our knowledge of the earth has been extended. Human courage and endurance are not less enthusiastically applauded than they once were; but they must be united to no common powers of observation before they will now raise a traveller to the highest rank. When we read a volume of recent travel, while warmly appreciating the spirit of adventure, fertility of resource, presence of mind, and other moral qualities of its author, we instinctively ask ourselves, as we close its pages, what may be the sum of its additions to our knowledge of the earth? From the geographical point of view—and it is to this point alone that these remarks apply—we must rank an explorer according to his success in widening our knowledge and enlarging our views regarding the aspects of nature.

The demands of modern geography are thus becoming every year more exacting. It requires more training in its explorers abroad, more knowledge on the part of its readers at home. The days are drawing to a close when one can gain undying geographical renown by struggling against man and beast, fever and hunger and drought, across some savage and previously unknown region, even though little can be shown as the outcome of the journey. All honour to the pioneers by whom this first exploratory work has been so nobly done! They will

be succeeded by a race that will find its laurels more difficult to win—a race from which more will be expected and which will need to make up in the variety, amount, and value of its detail, what it lacks in the freshness of first glimpses into new lands.

With no other science has geography become more intimately connected than with geology, and the connection is assuredly destined to become yet deeper and closer. These two branches of human knowledge are, to use Hakluyt's phrase, "the sunne and moone, the right eye and the left," of all fruitful inquiry into the character and history of the earth's surface. As it is impossible to understand the genius and temperament of a people, its laws and institutions, its manners and customs, its buildings and its industries, unless we trace back the history of that people, and mark the rise and effect of each varied influence by which its progress has been moulded in past generations; so it is clear that our knowledge of the aspect of a continent, its mountains and valleys, rivers and plains, and all its surface features, cannot be other than singularly feeble and imperfect, unless we realise what has been the origin of these features. The land has had a history, not less than the human races that inhabit it.

One can hardly consider attentively the future progress of geography without being convinced that in the wide development yet in store for this branch of human inquiry, one of its main lines of advance must be in the direction of what may be termed geographical evolution. The geographer will no longer be content to take continents and islands, mountain chains and river valleys, table-lands and plains, as initial or aboriginal outlines of the earth's surface. He will insist on knowing what the geologist can tell him regarding the growth of these outlines. He will try to trace out the gradual evolution of a continent, and may even construct maps to show its successive stages of development. At the same time he will seek for information regarding the history of the plants and animals of the region, and may find much to reward his inquiry as to the early migrations of the fauna and flora, including those even of man himself. Thus his pictures of the living world of to-day, as they become more detailed and accurate, will include more and more distinctly a background of bygone geographical conditions, out of which, by continuous sequence, the present conditions will be shown to have arisen.

I propose this evening to sketch in mere outline the aspects of one side of this evolutionary geography. I wish to examine in the first place the evidence whereby we establish the fundamental fact that the present surface of any country or continent is not that which it has always worn; and the data by which we may trace backward the origin of the land; and, in the second place, to consider, by way of illustration, some of the more salient features in the gradual growth of the framework of Europe.

The first of these two divisions of the subject deals with general principles, and may be conveniently grouped into two parts:—1st, The Materials of the Land. 2nd, The Building of the Land.

1.—*The Materials of the Land.*

Without attempting to enter into detailed treatment of this branch of the subject, we may, for the immediate purpose in view, content ourselves with the broad, useful classification of the materials of the land into two great series, (a) Fragmental and (b) Crystalline.

(a) *Fragmental*.—A very cursory examination of rocks in almost any part of the world suffices to show that by far the larger portion of them consists of compacted fragmentary materials. Shales, sandstones, and conglomerates in infinite variety of texture and colour, are piled above each other to form the foundation of plains and the structure of mountains. Each of these rocks is composed of distinct particles, worn by air, rain, frost, springs, rivers, glaciers, or the sea from previously existing rocks. They are thus derivative formations, and their source, as well as their mode of origin, can be determined. Their component grains are for the most part rounded, and bear evidence of having been rolled about in water. Thus we easily and rapidly reach a first and fundamental conclusion—that the substance of the main part of the solid land has been originally laid down and assorted under water.

The mere extent of the area covered by these water-formed rocks would of itself suggest that they must have been deposited in the sea. We cannot imagine rivers or lakes of magnitude sufficient to have spread over the sites of the present continents. The waters of the ocean, however, may easily be conceived to have rolled at different times over all that is now dry land. But the fragmental rocks contain within themselves proof that they were mainly of marine and not of lacustrine or fluvial origin. They have preserved in abundance the remains of foraminifera, corals, erinoids, molluscs, annelids, crustaceans, fishes, and other organisms of undoubtedly marine habitat, which must have lived and died in the places where their traces remain still visible.

But not only do these organisms occur scattered through sedimentary rocks; they actually themselves form thick masses of mineral matter. The Carboniferous or Mountain Limestone of Central England and Ireland for example reaches a thickness of from 2000 to 3000 feet, and covers thousands of square miles of surface. Yet it is almost entirely composed of congregated stems and joints and plates of erinoids, with foraminifera, corals, bryozoans, brachiopods, lamellibranchs, gastropods, fish-teeth, and other unequivocally marine organisms. It must have been for ages the bottom of a clear sea, over which generation after generation lived and died, until their accumulated remains had gathered into a compact sheet of rock. From the internal evidence of the stratified formations we thus confidently announce a second conclusion

—that a great portion of the solid land consists of materials which have been laid down on the floor of the sea.

From these familiar and obvious conclusions we may proceed further to inquire under what conditions these marine formations, so widely spread over the land, were formed. According to a popular belief, shared in perhaps by not a few geologists, land and sea have been continually changing places. It is supposed that while, on the one hand, there is no part of a continent over which sea-waves may not have rolled, so, on the other, there is no lonely abyss of the ocean where a wide continent may not have bloomed. That this notion rests upon a mistaken interpretation of the facts may be shown from an examination—(1) of the rocks of the land, and (2) of the bottom of the ocean.

Among the thickest masses of sedimentary rock—those of the ancient palaeozoic systems—no features recur more continually than the alternations of different sediments, and the recurrence of surfaces covered with well-preserved ripple-marks, trails and burrows of annelides, polygonal and irregular desiccation marks, like the cracks at the bottom of a sun-dried muddy pool. These phenomena unequivocally point to shallow and even littoral waters. They occur from bottom to top of formations which reach a thickness of several thousand feet. They can be interpreted only in one way, viz. that the formations in question began to be laid down in shallow water; that during their formation the area of deposit gradually subsided for thousands of feet; yet that the rate of accumulation of sediment kept pace on the whole with this depression; and hence, that the original shallow-water character of the deposits remained, even after the original sea-bottom had been buried under a vast mass of sedimentary matter. Now, if this explanation be true, even for the enormously thick and comparatively uniform formations of older geological periods, the relatively thin and much more varied formations of later date can offer no difficulty. In short, the more attentively the stratified rocks of the crust of the earth are studied, the more striking becomes the absence of any formations among them which can legitimately be considered those of a deep sea. They have all been deposited in comparatively shallow water.

The same conclusion may be arrived at from a consideration of the circumstances under which the deposition must have taken place. It is evident that the sedimentary rocks of all ages have been derived from the degradation of land. The gravel, sand, and mud, of which they consist, existed previously as part of mountains, hills, or plains. These materials carried down to the sea would arrange themselves there as they do still, the coarser portions nearest the shore, the finer silt and mud furthest from it. From the earliest geological times the great area of deposit has been, as it still is, the marginal belt of sea-floor skirting the land. It is there that nature has always strewn “the dust of continents to be.” The decay of old rocks has been unceasingly in

progress on the land, and the building up of new rocks has been as unintermittently going on underneath the adjoining sea. The two phenomena are the complementary sides of one process, which belongs to the terrestrial and shallow oceanic parts of the earth's surface and not to the wide and deep ocean basins.

Recent explorations of the bottom of the deep sea all over the world have brought additional light to this question. No part of the results obtained by the *Challenger* Expedition has a profounder interest for geologists and geographers than the proof which they furnish that the floor of the ocean basins has no real analogy among the sedimentary formations which form most of the framework of the land. We now know by actual dredging and inspection that the ordinary sediment washed off the land sinks to the sea-bottom before it reaches the deeper abysses, and that, as a rule, only the finer particles are carried more than a few score of miles from the shore. Instead of such sandy and pebbly material as we find so largely among the sedimentary rocks of the land, wide tracts of the sea-bottom at great depths are covered with various kinds of organic ooze, composed sometimes of minute calcareous foraminifera, sometimes of siliceous radiolaria or diatoms. Over other areas vast sheets of clay extend, derived apparently from the decomposition of volcanic detritus, of which large quantities are floated away from volcanic islands, and much of which may be produced by submarine volcanoes. On the tracts furthest removed from any land the sediment seems to settle scarcely so rapidly as the dust that gathers over the floor of a deserted hall. Mr. Murray, of the *Challenger* staff, has described how from these remote depths large numbers of shark's teeth and ear-bones of whales were dredged up. We cannot suppose the number of sharks and whales to be much greater in these regions than in others where their relics were found much less plentifully. The explanation of the abundance of their remains was supplied by their varied condition of decay and preservation. Some were comparatively fresh, others had greatly decayed, and were incrustated with or even deeply buried in a deposit of earthy manganese. Yet the same cast of the dredge brought up these different stages of decay from the same surface of the sea-floor. While generation after generation of sea-creatures drops its bones to the bottom, now here, now there, so exceedingly feeble is the rate of deposit of sediment that they lie uncovered, mayhap, for centuries, so that the remains which sink to-day, may lie side by side with the mouldered and incrustated bones that found their way to the bottom hundreds of years ago.

Another striking indication of the very slow rate at which sedimentation takes place in these abysses, has also been brought to notice by Mr. Murray. Among the clay from the bottom he found numerous minute spherical granules of native iron, which, as he suggests, are almost certainly of meteoric origin—fragments of those falling stars

which, coming to us from planetary space, burst into fragments when they rush into the denser layers of our atmosphere. In tracts where the growth of silt upon the sea-floor is excessively tardy, the fine particles, scattered by the dissipation of these meteorites, may remain in appreciable quantity. In this case, again, it is not needful to suppose that meteorites have disappeared over these ocean depths more numerous than over other parts of the earth's surface. The iron granules have no doubt been as plentifully showered down elsewhere, though they cannot be so readily detected in accumulating sediment. I know no recent discovery in physical geography more calculated to impress deeply the imagination than the testimony of this meteoric iron from the most distant abysses of the ocean. To be told that mud gathers on the floor of these abysses at an extremely slow rate, conveys but a vague notion of the tardiness of the process. But to learn that it gathers so slowly, that the very star-dust which falls from outer space, forms an appreciable part of it, brings home to us, as hardly anything else could do, the idea of undisturbed and excessively slow accumulation.

From all this evidence we may legitimately conclude that the present land of the globe, though formed in great measure of marine formations, has never lain under the deep sea; but that its site must always have been near land. Even its thick marine limestones are the deposits of comparatively shallow water. Whether or not any trace of aboriginal land may now be discoverable, the characters of the most unequivocally marine formations bear emphatic testimony to this proximity of a terrestrial surface. The present continental ridges have probably always existed in some form, and as a corollary we may infer that the present deep ocean basins likewise date from the remotest geological antiquity.

(b) *Crystalline*.—While the greater part of the framework of the land has been slowly built up of sedimentary materials, it is abundantly varied by the occurrence of crystalline masses, many of which have been injected in a molten condition into rents underground, or have been poured out in lava streams at the surface.

Without entering at all into geological detail, it will be enough for the present purpose to recognise the characters and origin of two great types of crystalline material which have been called respectively the Igneous and Metamorphic.

1. *Igneous*.—As the name denotes, Igneous rocks have risen from the heated interior of the earth. In a modern volcano, lava ascends the central funnel, and, issuing from the lip of the crater or from lateral fissures, pours down the slopes of the cone in sheets of melted rock. The upper surface of the lava column within the volcano is kept in constant ebullition by the rise of steam through its mass. Every now and then a vast body of steam rushes out with a terrific explosion, scattering the melted

lava into impalpable dust, and filling the air with ashes and stones, which descend in showers upon the surrounding country. At the surface, therefore, igneous rocks appear, partly as masses of congealed lava, and partly as more or less consolidated sheets of dust and stones. But beneath the surface there must be a downward prolongation of the lava column, which no doubt sends out veins into the rents of the subterranean rocks. We can suppose that the general aspect of the lava which consolidates at some depth will differ from that which solidifies above ground.

As a result of the revolutions which the crust of the earth has undergone, the roots of many ancient volcanoes have been laid bare. We have been as it were admitted into the secrets of these subterranean laboratories of nature, and have learned much regarding the mechanism of volcanic action, which we could never have discovered from any modern volcano. Thus, while on the one hand we meet with beds of lava and consolidated volcanic ashes, which were undoubtedly erupted at the surface of the ground in ancient periods, and were subsequently buried deep beneath sedimentary accumulations now removed; on the other hand, we find masses of igneous rock which certainly never came near the surface, but must have been arrested in their ascent from below, while still at a great depth, and have been laid bare to the light after the removal of the pile of rock under which they originally lay.

By noting these and other characters, geologists have learnt that, besides the regions of still active volcanoes, there are few large areas of the earth's surface where proofs of former volcanic action or of the protrusion of igneous rocks may not be found. The crust of the earth, crumpled and fissured, has been, so to speak, perforated and cemented together by molten matter driven up from below.

2. *Metamorphic*.—The sedimentary rocks of the land have undergone many changes since their formation, some of which are still far from being satisfactorily accounted for. One of these changes is expressed by the term *Metamorphism*, and the rocks which have undergone this process are called *Metamorphic*. It seems to have taken place under widely different conditions, being sometimes confined to small local tracts, at other times extending across a large portion of a continent. It consists in the rearrangement of the component materials of rocks, and notably in their recrystallisation along particular lines or laminae. It is usually associated with evidence of great pressure; the rocks in which it occurs having been corrugated and crumpled, not only in vast folds, which extend across whole mountains, but even in such minute puckerings as can only be observed with the microscope. It shows itself more particularly among the older geological formations, or those which have been once deeply buried under more recent masses of rock, and have been exposed as the result of the removal of these overlying accumulations. The original characters of the sandstones, shales,

grits, conglomerates, and limestones, of which no doubt these metamorphic masses once consisted, have been almost entirely effaced, and have given place to that peculiar crystalline laminated or foliated structure so distinctively a result of metamorphism.

An attentive examination of a metamorphic region shows that here and there the alteration and recrystallisation have proceeded so far that the rocks graduate into granites and other so-called igneous rocks. A series of specimens may be collected showing unaltered or at least quite recognisable sedimentary rocks at the one end, and thoroughly crystalline igneous rocks at the other. Thus the remarkable fact is brought home to the mind that ordinary sandstones, shales, and other sedimentary materials may in the course of ages be converted by underground changes into crystalline granite. The framework of the land, besides being knit together by masses of igneous rock intruded from below, has been strengthened by the welding and crystallisation of its lowest rocks. It is these rocks which rise along the central crests of mountain chains, where, after the lapse of ages, they have been uncovered and laid bare, to be bleached and shattered by frost and storm.

2.—*The Architecture of the Land.*

Let us now proceed to consider how these materials, sedimentary and crystalline, have been put together, so as to constitute the solid land of the globe.

It requires but a cursory examination to observe that the sedimentary masses have not been huddled together at random; that, on the contrary, they have been laid down in sheets one over the other. An arrangement of this kind at once betokens a chronological sequence. The rocks cannot all have been formed simultaneously. Those at the bottom must have been laid down before those at the top. A truism of this kind seems hardly to require formal statement. Yet it lies at the very foundation of any attempt to trace the geological history of a country. Did the rocks everywhere lie undisturbed one above another as they were originally laid down, their clear order of succession would carry with it its own evident interpretation. But such have been the changes that have arisen, partly from the operation of forces from below, partly from that of forces acting on the surface, that the true order of a series of rocks is not always so easily determined. By starting, however, from where the succession is normal and unbroken, the geologist can advance with confidence into regions where it has been completely interrupted; where the rocks have been shattered, crumpled, and even inverted.

The clue which guides us through these labyrinths is a very simple one. It is afforded by the remains of once living plants and animals which have been preserved in the rocky framework of the land. Each well-marked series of sedimentary accumulations contains its own

characteristic plants, corals, crustaceans, shells, fishes, or other organic remains. By these it can be identified and traced from country to country across a whole continent. When, therefore, the true order of superposition of the rocks has been ascertained by observing how they lie upon each other, the succession of their fossils is at the same time fixed. In this way the sedimentary part of the earth's crust has been classified into different formations, each characterised by its distinct assemblage of organic remains. In the most recent formations, most of these remains are identical with still living species of plants and animals; but as we descend in the series and come into progressively older deposits, the proportion of existing species diminishes until at last all the species of fossils are found to be extinct. Still lower and older rocks reveal types and assemblages of organisms which depart further and further from the existing order.

By noting the fossil contents of a formation, therefore, even in a district where the rocks have been so disturbed that their sequence is otherwise untraceable, the geologist can confidently assign their relative position to each of the fractured masses. He knows, for instance, using for our present purpose the letters of the alphabet to denote the sequence of the formations, that a mass of limestone containing fossils typical of the formation B must be younger than another mass of rock containing the fossils of A. A series of strata full of the fossils of H resting immediately on others charged with those of C, must evidently be separated from these by a great gap, elsewhere filled in by the intervening formations D, E, F, G. Nay, should the rocks in the upper part of a mountain be replete with the fossils proper to D, while those in the lower slopes showed only the fossils of E, F, and G, it could be demonstrated that the materials of the mountain had actually been turned upside down, for, as proved by its organic remains, the oldest and therefore lowest formation had come to lie at the top, and the youngest, and therefore highest, at the bottom.

Of absolute chronology in such questions science can as yet give no measure. How many millions of years each formation may have required for its production, and how far back in time may be the era of any given group of fossils, are problems to which no answer, other than a mere guess, can be returned. But this is a matter of far less moment than the relative chronology, which can usually be accurately fixed for each country, and on which all attempts to trace back the history of the land must be based.

While, then, it is true that most of the materials of the solid land have been laid down at successive periods under the sea, and that the relative dates of their deposition can be determined, it is no less certain that the formation of these materials has not proceeded uninterruptedly, and that they have not finally been raised into land by a single movement. The mere fact that they are of marine origin shows, of course,

that the land owes its origin to some kind of terrestrial disturbance. But when the sedimentary formations are examined in detail, they present a most wonderful chronicle of long-continued, oft-repeated, and exceedingly complex movements of the crust of the globe. They show that the history of every country has been long and eventful; that, in short, hardly any portion of the land has reached its present condition, save after a protracted series of geological revolutions.

One of the most obvious and not the least striking features in the architecture of the land is the frequency with which the rocks, though originally horizontal, or approximately so, have been tilted up at various angles, or even placed on end. At first it might be supposed that these disturbed positions have been assumed at random, according to the capricious operations of subterranean forces. They seem to follow no order, and to defy any attempt to reduce them to system. Yet a closer scrutiny serves to establish a real connection among them. They are found, for the most part, to belong to great, though fractured, curves, into which the crust of the earth has been folded. In low countries far removed from any great mountain range, the rocks often present scarcely a trace of disturbance, or if they have been affected, it is chiefly by having been thrown into gentle undulations. As we approach the higher grounds, however, they manifest increasing signs of commotion. Their undulations become more frequent and steeper, until, entering within the mountain region, we find the rocks curved, crumpled, fractured, inverted, tossed over each other into yawning gulf and towering crest, like billows arrested at the height of a furious storm.

Yet even in the midst of such apparent chaos it is not impossible to trace the fundamental law and order by which it is underlaid. The prime fact to be noted is the universal plication and crumpling of rocks which were at first nearly horizontal. From the gentle undulations of the strata beneath the plains to their violent contortion and inversion among the mountains, there is that insensible gradation which connects the whole of these disturbances as parts of one common process. They cannot be accounted for by any mere local movements, though such movements no doubt took place abundantly. The existence of a mountain chain is not to be explained by a special upheaval or series of upheavals caused by an expansive force acting from below. Manifestly the elevation is only one phase of a vast terrestrial movement which has extended over whole continents, and has affected plains as well as high grounds.

The only cause which, so far as our present knowledge goes, could have produced such wide-spread changes is a general contraction of the earth's mass. There can be no doubt that at one time our planet existed in a gaseous, then in a liquid condition. Since these early periods it has continued to lose heat, and consequently to contract and to grow

more and more solid, until, as the physicists insist, it has now become practically as rigid as a globe of glass or of steel. But in the course of the contraction, after the solid external crust was formed, the inner hot nucleus has lost heat more rapidly than the crust, and has tended to shrink inward from it. As a consequence of this internal movement, the outer solid shell has been obliged to sink down upon the retreating nucleus. In so doing, it has of course had to accommodate itself to a diminished area, and this it could only accomplish by undergoing plication and crumpling. Though the analogy is not a very exact one, we may liken our globe to a shrivelled apple. The skin of the apple does not contract equally. As the internal moisture passes off, and the bulk of the fruit is reduced, the once smooth exterior becomes here and there corrugated and dimpled.

Without entering into this difficult problem in physical geology, it may suffice if we carry with us the idea that our globe must once have had a greater diameter than it now possesses, and that the crumpling of its outer layers, whether due to mere contraction or, as has been suggested, to the escape also of subterranean vapours, affords evidence of this diminution. A little reflection suffices to show us that, even without any knowledge of the actual history of the contraction, we might anticipate that the effects would neither be continuous nor everywhere uniform. The solid crust would not, we may be sure, subside as fast as the mass inside. It would, for a time at least, cohere and support itself, until at last, gravitation proving too much for its strength, it would sink down. And the areas and amount of descent would be greatly regulated by the varying thickness and structure of the crust. Subsidence would not take place everywhere; for, as a consequence of the narrower space into which the crust sank, some regions would necessarily be pushed up. These conditions appear to have been fulfilled in the past history of the earth. There is evidence that the terrestrial disturbance has been renewed again and again, after long pauses, and that, while the ocean basins have on the whole been the great areas of depression, the continents have been the lines of uprise or relief, where the rocks were crumpled and pushed out of the way. Paradoxical, therefore, as the statement may appear, it is nevertheless strictly true that the solid land, considered with reference to the earth's surface as a whole, is the consequence of subsidence rather than of upheaval.

Grasping, then, this conception of the real character of the movements to which the earth owes its present surface configuration, we are furnished with fresh light for exploring the ancient history and growth of the solid land. The great continental ridges seem to lie nearly on the site of the earliest lines of relief from the strain of contraction. They were forced up between the subsiding oceanic basins at a very early period of geological history. In each succeeding epoch of movement they were naturally used over again, and received an additional

push upward. Hence we see the meaning of the evidence supplied by the sedimentary rocks as to shallow seas and proximity of land. These rocks could not have been otherwise produced. They were derived from the waste of the land, and were deposited near the land. For it must be borne in mind that every mass of land as soon as it appeared above water was at once attacked by the ceaseless erosion of moving water and atmospheric influences, and immediately began to furnish materials for the construction of future lands, to be afterwards raised out of the sea.

Each great period of contraction elevated anew the much-worn land, and at the same time brought the consolidated marine sediments above water as parts of a new terrestrial surface. Again a long interval would ensue, marked perhaps by a slow subsidence both of the land and sea-bottom. Meanwhile the surface of the land was channelled and lowered, and its detritus was spread over the sea-floor, until another era of disturbance raised it once more with a portion of the surrounding ocean-bed. These successive upward and downward movements explain why the sedimentary formations do not occur as a continuous series, but often lie each upon the upturned and worn edges of its predecessors.

Returning now to the chronological sequence indicated by the organic remains preserved among the sedimentary rocks, we see how it may be possible to determine the relative order of the successive upheavals of a continent. If, for example, a group of rocks, which, as before, may be called A, were found to have been upturned and covered over by undisturbed beds C, the disturbance could be affirmed to have occurred at some part of the epoch represented elsewhere by the missing series B. If, again, the group C were observed to have been subsequently tilted, and to pass under gently inclined or horizontal strata E, a second period of disturbance would be proved to have occurred between the time of C and E.

I have referred to the unceasing destruction of its surface which the land undergoes from the time when it emerges out of the sea. As a rule, our conceptions of the rate of this degradation are exceedingly vague. Yet they may easily be made more definite by a consideration of present changes on the surface of the land. Every river carries yearly to the sea an immense amount of sand and mud. But this amount is capable of measurement. It represents, of course, the extent to which the general level of the surface of the river's drainage basin is annually lowered. According to such measurements and computations as have been already made, it appears that somewhere about $\frac{1}{6000}$ of a foot is every year removed from the surface of its drainage basin by a large river. This seems a small fraction, yet by the power of mere addition it soon mounts up to a large total. Taking the mean level of Europe to be 600 feet, its surface, if everywhere worn away at what seems to

be the present mean normal rate, would be entirely reduced to the sea-level in little more than three and a half millions of years.

But of course the waste is not uniform over the whole surface. It is greatest on the slopes and valleys, least on the more level grounds. A few years ago, in making some estimates of the ratios between the rates of waste on these areas, I assumed that the tracts of more rapid erosion occupy only one-ninth of the whole surface affected, and that in these the rate of destruction is nine times greater than on the more level spaces. Taking these proportions, and granting that $\frac{1}{6000}$ of a foot is the actual ascertained amount of loss from the whole surface, we ascertain by a simple arithmetical process that $\frac{1}{12}$ of an inch is carried away from the plains and table-lands in seventy-five years, while the same amount is worn out of the valleys in eight and a half years. One foot must be removed from the former in 10,800 years, and from the latter in 1200 years. Hence we learn, that at the present rate of erosion a valley 1000 feet deep may be excavated in 1,200,000 years—by no means a very long period in the conceptions of most geologists.

I do not offer these figures as more than tentative results. They are based, however, not on mere guesses, but on data which, though they may be corrected by subsequent inquiry, are the best at present available, and are probably not far from the truth. They are of value in enabling us more vividly to realise how the prodigious waste of the land, proved by the existence of such enormous masses of sedimentary rock, went quietly on age after age, until results were achieved which seem at first scarcely possible to so slow and gentle an agency.

It is during this quiet process of decay and removal that all the distinctive minor features of the land are wrought out. When first elevated from the sea, the land doubtless presents on the whole a featureless surface. It may be likened to a block of marble raised out of the quarry—rough and rude in outline, massive in solidity and strength, but giving no indication of the grace into which it will grow under the hand of the sculptor. What art effects upon the marble block, nature accomplishes upon the surface of the land. Her tools are many and varied—air, frost, rain, springs, torrents, rivers, avalanches, glaciers, and the sea—each producing its own characteristic traces in the sculpture. With these implements, out of the huge bulk of the land she cuts the valleys and ravines, scoops the lake-basins, hews with bold free hand the colossal outline of the mountains, carves out peak and crag, crest and cliff, chisels the courses of the torrents, splinters the sides of the precipices, and leaves her impress upon every lincament of the land. Patiently and unceasingly has this great earth-sculptor sat at her task since the land first rose above the sea, washing down into the ocean the *débris* of her labour, to form the materials for the framework of future countries; and there will she remain at work, so long as mountains stand, and rain falls, and rivers flow.

THE GROWTH OF THE EUROPEAN CONTINENT.

Passing now from the general principles with which we have hitherto been dealing, we may seek an illustration of their application to the actual history of a large mass of land. For this purpose, let me ask your attention to some of the more salient features in the gradual growth of Europe. This continent has not the simplicity of structure elsewhere recognisable; but without entering into detail or following a continuous sequence of events, our present purpose will be served by a few broad outlines of the condition of the European area at successive geological periods.

It is the fate of continents, no less than of the human communities that inhabit them, to have their first origin shrouded in obscurity. When the curtain of darkness begins to rise from our primeval Europe, it reveals to us a scene marvellously unlike that of the existing continent. The land then lay chiefly to the north and north-west, probably extending as far as the edge of the great submarine plateau by which the European ridge is prolonged under the Atlantic for 230 miles to the west of Ireland. Worn fragments of that land exist in Finland, Scandinavia, and the north-west of Scotland, and there are traces of what seem to have been some detached islands in Central Europe, notably in Bohemia and Bavaria. Its original height and extent can of course never be known; but some idea of them may be formed by considering the bulk of solid rock which was formed out of the waste of that land. I find that if we take merely one portion of the detritus washed from its surface and laid down in the sea, viz. that which is comprised in what is termed the Silurian system, and if we assume that it spreads over 60,000 square miles of Britain with an average thickness of 16,000 feet, or 3 miles, which is probably under the truth, then we obtain the enormous mass of 180,000 cubic miles. The magnitude of this pile of material may be better realised if we reflect that it would form a mountain ridge three times as long as the Alps, or from the North Cape to Marseilles (1800 miles), with a breadth of more than 33 miles, and an average height of 16,000 feet, that is, higher than the summit of Mont Blanc. All this vast pile of sedimentary rock was worn from the slopes and shores of the primeval northern land. Yet it represents but a small fraction of the material so removed, for the sea of that ancient time spread over nearly the whole of Europe eastwards into Asia, and everywhere received a tribute of sand and mud from the adjoining shores.

There is perhaps no mass of rock so striking in its general aspect as that of which this northern embryo of Europe consisted. It lacks the variety of composition, structure, colour, and form, which distinguishes rocks of more modern growth. But in dignity of massive strength it stands altogether unrivalled. From the headlands of the

Hebrides to the far fiords of Arctic Norway it rises up grim and defiant of the elements. Its veins of quartz, felspar, and hornblende, project from every boss and crag like the twisted and knotted sinews of a magnificent torso. Well does the old gneiss of the north deserve to have been made the foundation stone of a continent.

Whether vegetation clothed this earliest prototype of Europe, and if so, what were its characters, are questions to which at present no answer is possible. We know, however, that the shallow sea which spread from the Atlantic southward and eastward over most of Europe was tenanted by an abundant and characteristic series of invertebrate animals—trilobites, graptolites, cystideans, brachiopods, and cephalopods, strangely unlike on the whole to anything living in our waters now, but which then migrated freely along the shores of the Arctic land between what are now America and Europe.

The floor of this shallow sea continued to sink until over Britain at least it had gone down several miles. Yet the water remained shallow because the amount of sediment constantly poured into it from the north-west filled it up about as fast as the bottom subsided. This slow subterranean movement was varied by uprisings here and there, and notably by the outburst at successive periods of a great group of active submarine volcanoes over Wales, the Lake District, and the south of Ireland. But at the close of the Silurian period a vast series of disturbances took place, as the consequence of which the first rough outlines of the European continent were blocked out. The floor of the sea was raised into long ridges of land, among which were some on the site of the Alps, the Spanish peninsula, and the hills of the west and north of Britain. The thick mass of marine sediment was crumpled up, and here and there even converted into hard crystalline rock. Large enclosed basins, gradually cut off from the sea, like the modern Caspian and Sea of Aral, extended from beyond the west of Ireland across to Scandinavia and even into the west of Russia. These lakes abounded in bone-covered fishes of strange and now long-extinct types, while the land around was clothed with a club-moss and reed-like vegetation—*Psilophyton*, *Sigillaria*, *Calamite*, &c.—the oldest terrestrial flora yet known in Europe. The sea, dotted with numerous islands, appears to have covered most of the heart of the continent.

A curious fact deserves to be noticed here. During the convulsions by which the sediments of the Silurian sea-floor were crumpled up, crystallised, and elevated into land, the area of Russia seems to have remained nearly unaffected. Not only so, but the same immunity from violent disturbance has prevailed over that vast territory during all subsequent geological periods. The Ural Mountains on the east have again and again served as lines of relief, and have been from time to time ridged up anew. The German domains on the west have likewise suffered extreme convulsion. But the wide intervening plateau of

Russia has apparently always maintained its flatness either as sea-bottom or as terrestrial plains.

By the time of the coal growths, the aspect of the European area had still further changed. It then consisted of a series of low ridges or islands in the midst of a shallow sea or of wide salt-water lagoons. A group of islands occupied the site of some of the existing high grounds of Britain. A long, irregular ridge ran across what is now France from Brittany to the Mediterranean. The Spanish peninsula stood as a detached island. The future Alps rose as a long, low ridge, to the north of the eastern edge of which lay another insular space, where now we find the high grounds of Bavaria and Bohemia. The shallow waters which wound among these scattered patches of land were gradually silted up. Many of them became marshes, crowded with a most luxuriant cryptogamic vegetation, specially of lycopods and ferns, while the dry grounds waved green with coniferous trees. By a slow intermittent subsidence, islet after islet sank beneath the verdant swamps. Each fresh depression submerged the rank jungles and buried them under sand and mud, where they were eventually compressed into coal. To this united co-operation of dense vegetable growth, accumulation of sediment, and slow subterranean movement Europe owes her coal-fields.

All this time the chief area of high ground in Europe appears still to have lain to the north and north-west. The old gnarled gneiss of that region, though constantly worn down and furnishing materials towards each new formation, yet rose up as land. It no doubt received successive elevations during the periods of disturbance, which more or less compensated for the constant loss from its surface.

The next scene we may contemplate brings before us a series of salt lakes, covering the centre of the continent from the north of Ireland to the heart of Poland. These basins were formed by the gradual cutting off of portions of the sea which had spread over the region. Their waters were red and bitter, and singularly unfavourable to life. On the low intervening ridges a coniferous and cycadaceous vegetation grew, sometimes in quantity sufficient to supply materials for the formation of coal-seams. The largest of these salt lakes stretched from the edge of the old plateau of Central France along the base of the Alpine ridge to the high grounds of Bohemia, and included the basin of the Rhine from Bâle down to the ridge beyond Mayence, which has been subsequently cut through by the river into the picturesque gorges between Bingen and the Siebengebirge. This lake was filled up with red sand and mud, limestone, and beds of rock salt. Where the eastern Alps now rise the enclosed water-basins were the scene of a long-continued growth of dolomite, out of which in later ages the famous dolomite mountains of the Tyrol were carved.

These salt lakes of the Triassic period seem to have been everywhere quietly effaced by a wide-spread depression, which allowed the water of

the main ocean once more to overspread the greater part of Europe. This slow subsidence went on so long as to admit of the accumulation of masses of limestone, shale, and sandstone, several thousand feet in thickness, and probably to bring most of the insular tracts of Central Europe under water. To this period, termed by geologists the Jurassic, we can trace back the origin of a large part of the rock now forming the surface of the continent, from the low plains of Central England up to the crests of the northern Alps, while in the Mediterranean basin, rocks of the same age cover a large area of the plateau of Spain, and form the central mass of the chain of the Apennines. It is interesting to know that the north-west of Britain continued still to rise as land in spite of all the geographical changes which had taken place to the south and east. We can trace even yet the shores of the Jurassic sea along the skirts of the mountains of Skye and Ross-shire.

The next long era, termed the Cretaceous, was likewise more remarkable for slow accumulation of rock under the sea than for the formation of new land. During that time the Atlantic sent its waters across the whole of Europe and into Asia. But they were probably nowhere more than a few hundred feet deep over the site of our continent, even at their deepest part. Upon their bottom there gathered a vast mass of calcareous mud, composed in great part of foraminifera, corals, echinoderms, and molluscs. Our English chalk which ranges across the north of France, Belgium, Denmark, and the north of Germany, represents a portion of the deposits of that sea-floor. Some of the island spaces which had remained for a vast period above water, and had by their degradation supplied materials for the sediment of successive geological formations, now went down beneath the Cretaceous sea. The ancient high-grounds of Bohemia, the Alps, the Pyrenees, and the Spanish table-land, were either entirely submerged, or at least had their area very considerably reduced. The submergence likewise affected the north-west of Britain; the western highlands of Scotland lay more than 1000 feet below their present level.

When we turn to the succeeding geological period, that of the Eocene, the proofs of wide-spread submergence are still more striking. A large part of the Old World seems to have sunk down; for we find that one wide stretch of sea extended across the whole of Central Europe and Asia. It was at the close of this period of extreme depression, that those subterranean movements began to which the present configuration of Europe is mainly due. The Pyrenees, Alps, Apennines, Carpathians, the Caucasus, and the heights of Asia Minor mark as it were the crests of the vast earth-waves into which the solid framework of Europe was then thrown. So enormous was the contortion that, as may be seen along the northern Alps, the rocks for thousands of feet were completely inverted, this inversion being accompanied by the most colossal folding and twisting. The massive sedimentary formations were crumpled up,

and doubled over each other, as we might fold a pile of cloth. In the midst of these commotions the west of Europe remained undisturbed. It is strange to reflect that the soft clays and sands under London are as old as some of the hardened rocks which have been upheaved into such picturesque peaks along the northern flanks of the Alps.

After the completion of these vast terrestrial disturbances, the outlines of Europe began distinctly to shape themselves into their present form. The Alps rose as a great mountain range, flanked on the north by a vast lake which covered all the present lowlands of Switzerland, and stretched northwards across a part of the Jura Mountains, and eastwards into Germany. The size of this fresh-water basin may be inferred from the fact that one portion only of the sand and gravel that accumulated in it even now measures 6000 feet in thickness. The surrounding land was densely clothed with a vegetation indicative of a much warmer climate than Europe now can boast. Palms of American types, as well as date palms, huge Californian pines (*Sequoia*), laurels, cypresses, and evergreen oaks, with many other evergreen trees, gave a distinctive character to the vegetation. Among the trees too were planes, poplars, maples, willows, oaks, and other ancestors of our living woods and forests; numerous ferns grew in the underwood, while clematis and vine wound themselves among the branches. The waters were haunted by huge pachyderms, such as the *dinotherium* and *hippopotamus*; while the rhinoceros and mastodon roamed through the woodlands.

A marked feature of this period in Europe was the abundance and activity of the volcanoes. In Hungary, Rhineland, and Central France, numerous vents opened and poured out their streams of lava and showers of ashes. From the south of Antrim, also, another great line of active orifices ran up the west coast of Scotland and by the Faroe Islands to Iceland, whence it extended even far into Arctic Greenland.

The mild climate indicated by the vegetation in the deposits of the Swiss lake, prevailed even into Polar latitudes, for the remains of numerous evergreen shrubs, oaks, maples, walnuts, hazels, and many other trees, have been found under the sheets of lava in the far north of Greenland. The sea still occupied much of the lowlands of Europe. Thus it ran as a strait between the Bay of Biscay and the Mediterranean, cutting off the Pyrenees and Spain from the rest of the continent. It swept round the north of France, covering the rich fields of Touraine and the wide flats of the Netherlands. It rolled far up the plains of the Danube and stretched thence eastwards across the south of Russia into Asia.

By this time not a few of the species of shells which still people the European seas had appeared. So long have they been natives of our area that they have witnessed the rise of a great part of the continent. Some of the most stupendous changes which they have seen have taken place in

the basin of the Mediterranean, where, at a comparatively recent geological period, parts of the sea-floor have been upheaved to a height of 3000 feet. It was then that the breadth of the Italian peninsula was increased by the belt of lower hills that flanks the range of the Apennines. Then, too, Vesuvius and Etna began their eruptions. Among these later geographical events also we must place the gradual isolation of the Sea of Aral, the Caspian, and the Black Sea from the rest of the ocean, which once spread from the Arctic regions down the west of Asia, along the base of the Ural Mountains into the south-east of Europe.

The last scene in this long history is one of the most unexpected of all. Europe, having nearly its present height and outlines, is swathed deep in snow and ice. Scandinavia and Finland are one vast sheet of ice, that creeps down from the watershed into the Atlantic on the one side, and into the basin of the Baltic on the other. All the high grounds of Britain are similarly buried. The bed of the North Sea as well as of the Baltic is in great measure choked with ice. The Alps, the Pyrenees, the Carpathians, and the Caucasus send down vast glaciers into the plains at their base. Northern plants find their way south even to the Pyrenees, while the reindeer, musk-ox, lemming, and their Arctic companions roam far and wide over France.

As a result of the prolonged passage of solid masses of ice over them, the rocks on the surface of the continent, when once more laid bare to the sun, present a worn, flowing outline. They have been hollowed into basins, ground smooth, and polished. Long mounds and wide sheets of clay, gravel, and sand have been left over the low grounds, and the hollows between them are filled with innumerable tarns and lakes. Crowds of boulders have been perched on the sides of the hills and dropped over the plains. With the advent of a milder temperature the Arctic vegetation has gradually disappeared from the plains. Driven up step by step before the advancing flora from more genial climates, it retired into the mountains and there to this day continues to maintain itself. The present Alpine flora of the Pyrenees, the Alps, Britain, and Scandinavia, is thus a living record of the ice-age. The reindeer and his friends have long since been forced to return to their northern homes.

After this long succession of physical revolutions, man appears as a denizen of the Europe thus prepared for him. The earliest records of his presence reveal him as a fisher and hunter, with rude flint-pointed spear and harpoon. And doubtless for many a dim century such was his condition. He made no more impress on external nature than one of the beasts which he chased. But in course of time, as civilisation grew, he asserted his claim to be one of the geographical forces of the globe. Not content with gathering the fruits and capturing the animals which he found needful for his wants, he gradually entered on a contest with nature to subdue the earth and to possess it. Nowhere has this

warfare been fought out so vigorously as on the surface of Europe. On the one hand, wide dark regions of ancient forest have given place to smiling cornfields. Peat and moor have made way for pasture and tillage. On the other hand, by the clearance of woodlands the rainfall has been so diminished that drought and barrenness have spread where verdure and luxuriance once prevailed. Rivers have been straitened and made to keep their channels, the sea has been barred back from its former shores. For many generations the surface of the continent has been covered with roads, villages and towns, bridges, aqueducts and canals, to which this century has added a multitudinous network of railways, with their embankments and tunnels. In short, wherever man has lived, the ground beneath him bears witness to his presence. It is slowly covered with a stratum either wholly formed by him or due in great measure to his operations. The soil under old cities has been increased to a depth of many feet by the rubbish of his buildings; the level of the streets of modern Rome stands high above that of the pavement of the Cæsars, and that again above the roadways of the early Republic. Over cultivated fields his potsherds are turned up in abundance by the plough. The loam has risen within the walls of his graveyards as generation after generation has mouldered into dust.

It must be owned that man, in most of his struggle with the world around him, has fought blindly for his own ultimate interests. His contest, successful for the moment, has too often led to sure and sad disaster. Stripping forests from hill and mountain, he has gained his immediate object in the possession of their abundant stores of timber; but he has laid open the slopes to be parched by drought, or to be swept bare by rain. Countries once rich in beauty, and plenteous in all that was needful for his support, are now burnt and barren, or almost denuded of their soil. Gradually he has been taught by his own bitter experience, that while his aim still is to subdue the earth, he can attain it, not by setting nature and her laws at defiance, but by enlisting them in his service. He has learnt at last to be the minister and interpreter of nature, and he finds in her a ready and unrepining slave.

In fine, looking back across the long eyeles of change through which the land has been shaped into its present form, let us realise that these geographical revolutions are not events wholly of the dim past, but that they are still in progress. So slow and measured has been their march, that even from the earliest times of human history they seem hardly to have advanced at all. But none the less are they surely and steadily transpiring around us. In the fall of rain and the flow of rivers, in the bubble of springs and the silence of frost, in the quiet creep of glaciers and the tumultuous rush of ocean waves, in the tremor of the earthquake and the outburst of the volcano, we may recognise the same play of terrestrial forces by which the framework of the continents has been step by step evolved. In this light the familiar

phenomena of our daily experience acquire an historical interest and dignity. Through them we are enabled to bring the remote past vividly before us, and to look forward hopefully to that great future in which, in the physical not less than in the moral world, man is to be a fellow-worker with God.

On the termination of the lecture,

The CHAIRMAN (Mr. Francis Galton) said many thoughts must have occurred to the minds of the members in listening to Mr. Geikie's brilliant and lucid address. They must have felt regret that they did not possess pictures of typical geographical scenery that should be true to the eye of the geologist, and faithfully represent the fauna and flora of the country, and the chief physical aspects of nature. He would say more on the subject of the lecture, were it not that he saw present several very distinguished geologists, including Mr. Evans, the recent President of the Geological Society. But he would content himself with calling upon the gentleman whose geological pupil Mr. Geikie originally was, and of whom in his public writings Mr. Geikie had uniformly spoken with the greatest respect. He alluded to Professor Ramsay, the successor of Sir Roderick Murchison as Director of the Geological Survey of England, and, he might be permitted to add, the President designate of the British Association for the year 1880.

Professor A. C. RAMSAY congratulated the Society on having had the opportunity of listening to a lecture which showed such a profound knowledge of the structure of the earth, and of those causes which had led to the modern physical geography of the world. In a general way, half-a-dozen lectures would scarcely have been sufficient to give all the information that Mr. Geikie had condensed into one. He did not quarrel with him for putting so much in such an excellent epitome, but he regretted that it had not been spread over several lectures, so that the large number of topics touched upon might have been dealt with *in extenso*, and thus the Meeting might have been able to carry away a little encyclopædia of physical geography. The physical geography of the modern world was but the result of all the various changes that had taken place for all time past, or at all events for all the ages which the study of the rocks indicated. Geology had only to do with the history of the world since the solid rocks were formed, but none of the first solid rocks were now in existence, for the oldest strata that man had ever yet seen on the surface of the earth were metamorphic rocks, which implied the wasting of a still older land. All that was known was that that first land was spread about as ordinary sediments of sand, mud, limestone, and then through some of those revolutions which afterwards took place it was heaved up, and turned into mountain chains. Then the sea flowed over it and new sediments were formed, and the same process was repeated for a long period of time. Modern physical geography was the temporary result of all those changes, but had not lasted nearly so long as many of the old conditions that had entirely vanished, except to the skilled eye of those who had a thorough knowledge of present geological information. To the vulgar eye those ancient relics simply looked like little bits here and there of the scenery of the modern physical geography of the world. When the modern appearance of the earth was analysed and anatomised, when the integuments were taken off, then a great number of fragments of old skeletons were laid bare. This process was similar to that with which students of Darwin's profound speculations on life and time were acquainted. They took the modern fauna of the world, and going back in time they found that they had predecessors which were not quite the same:—two-toed horses; further back three-toed horses: pigs of the present day; further back ruminant pigs—pigs, so to speak, more or less allied to cows, and so on. The longer the time the greater the difference, but yet all was consistent, and each

formed a part of one great demonstration of the development of life. So was it with the physical world, which no doubt began before there was any life upon it. The rocky life of the world, like the animal life, had been going through successive phases, and at length the present temporary conditions had been developed. This was an epitome of the general tendency of the subject, of which Mr. Geikie had given so admirable a sketch in his lecture.

Explorations in Western Tibet, by the Trans-Himalayan parties of the Indian Trigonometrical Survey.

THE 'Report on the Survey of India for 1877-78,' a few copies of which have just reached this country, contains a very interesting Report on the Trans-Himalayan operations (trigonometrical), conducted under Mr. E. C. Ryall, in Hundes, a district in the western part of Chinese Tibet, and adjoining tracts.

This officer had been engaged in triangulating, in connection with the Kumáon and Garhwál Survey, for some few seasons past, and this work has led him in several instances to extend his operations across the frontier into Chinese territory, with which the British possessions are here conterminous. In 1877, the Surveyor-General directed Mr. Ryall to continue the Milam Valley series up to the frontier of Hundes, or Nari-Khorsam (the name applied to that portion of the Upper Sutlej or Karnali basins which is under the Government of China), and from thence to lay down some of the distant peaks in Chinese Tibet. This Mr. Ryall successfully accomplished, and the number of triangles measured by him were thirty-eight in number, exceeding 100 miles in length.

At first the mountains encountered were of an average height of 9700 feet, well wooded, and not over rugged, their slopes being studded with numerous villages and extensive patches of cultivation. On Mr. Ryall's arrival at the loftier stations, the inclemency of the weather and the very great depth of fresh snow, covering the mountains down to their very bases, were such that he anticipated his further progress would escape the knowledge of the Chinese officials, owing to the deserted state of the passes at that early season. After five days' cutting through the snow, Mr. Ryall succeeded in crossing over into Hundes on the 8th June. By that time his arrival became known to the Chinese officials, but by informing them that his object was simply to survey the northern limits of British territory, which he found it impossible to do from the southern faces, he succeeded in satisfying them and in obtaining permission to remain. With great despatch (for the monsoons were fast approaching), he fixed the most prominent points, which included the snowy peaks across the Sutlej and at the head of the Manasarowar lakes, and others lying at the head of the Darma and Byans Valley, as well as the well-determined peaks in Kumáon and Garhwál, as a check on the new work. The remarkable peak Leo Pargial (of which a striking

description is given by Mr. Andrew Wilson in his 'Abode of Snow') was fixed, and differed in position but very slightly from previous measurements. From the Hundes station thirty-eight peaks were laid down across the Sutlej. The most remarkable of these is Gurla Mandhata, a name of Indian origin, the legends of the Milam Bhotias being to the effect that the great mountain is the transformation of the body of a raja of Benares called Mandhata, who is said to have died some thousands of years ago on the shores of the Manasarowar Lake, while on a holy pilgrimage to its waters. Gurla Mandhata attains an elevation of 25,360 feet, while between it and Kailas (another well-known peak), lie the celebrated lakes of Manasarowar, Cho Mapang, and Lang Cho. Kailas, though inferior in height to the former peak, is very striking in its appearance. It is not unlike a roughly made Hindu or Pandu temple, with a few feet of its conical top broken off. This has led to its being invested by the Hindus of Northern India with a sacred character, which is enhanced by its immense bulk and height, towering as it does full 2000 feet above its compeers for 40 miles round. Excepting Nanga Parbat it is probably the most conspicuous and impressive sight in the whole Himalayas. Mr. Ryall states that his triangulation of Hundes has been so far extended as to supply good bases for a detail survey, if it ever be desirable to have one.

Hundes or Nari-Khorsam is divided into three districts, viz. Tsaparang, Daba, and Purang, all under the governorship of the Garpan of Gartok, whose authority extends also over the district of Rudok, which together with that of Gartok comprise the country called Monyul. Mr. Ryall states that, as a rule, for about 6 miles after leaving the watershed line on the frontier, one finds oneself hemmed in by steep though not rugged spurs, which suddenly merge into almost absolute plains, sloping gently to within a few miles of the Sutlej, where they break up into narrow spurs or ribs separating deep ravines. The cliffs overhanging the Sutlej exceed 2000 feet a few miles below Dongpu. The mountains on the north of the Sutlej are rounded and undulating, with groups of tiny peaks cropping up here and there. The average height of this range of mountains (which has no general name) is not more than 2500 feet above the general level of the plateau. To all appearance these mountains might be crossed anywhere, some of the passes over the water-parting having an almost imperceptible rise. Judging from the fact that the fall of snow in the early part of 1877 was exceptionally great, Mr. Ryall concludes that the snow-line is rarely under 20,000 feet in any part of Hundes.

From a central position the view presented by the whole of the Hundes Valley was that of an extensive plain, interrupted here and there by a few groups of isolated low ridges, lying principally east of the valley, and west of the Manasarowar lakes. The poplar is cultivated along the lower banks of large streams, but beyond this there are

absolutely no trees indigenous to this desolate country. The plains, the low ridges on them, and the mountains separating these from the British dominions, are chiefly composed of clay, slate, and fossiliferous limestone.

The houses in Tsaparang and Daba (the chief towns in their districts) are built like those in Ladakh, of uncut stones and clay cement, roofed with beams and rafters of poplar wood, the walls being plastered over with white clay. Each of these towns contains a small armed mounted police, who assist in levying duties on merchandise. Taklakhar, the chief town in Purang, is a military outpost containing a garrison of about 100 men, situated on the right of the Map-chu, or *Big River*, known as the Karnali in the Ghorka territories, and to the north of a small stream coming down from the Byans Pass. The fort consists of a series of excavations, in a huge mound rising abruptly to a height of about 800 feet. Store-rooms are situated on the top of these excavations, and contain immense stores of grain and ammunition. Some quantities of grain are said to be no less than fifty years old, the extreme dryness of the atmosphere allowing cereals to be kept almost any time without deterioration. Taklakhar is the last or furthestmost post occupied by the Dogras during their brief invasion in 1841, under Zorawar Sing, a graphic account of which is given in Cunningham's 'Ladak.' West of Taklakhar Fort is Sibling Gonpa, the largest monastery in Nari-Khorsam, maintaining 310 lamas, and a great accumulation of wealth.

The people of Hundes are called Hunias by the inhabitants of the higher valleys in British territory adjoining. They are of Tartar origin, and have the leading ethnological characteristics of that race, high cheek bones, flat noses, broad at the base, rather full lips, narrow and slightly oblique eyes, square and broad shoulders, and middling in stature. They are all, even the young, more or less wrinkled in appearance, and the old are described as hideous from it. They own large flocks of sheep, and herds of cattle and goats, the poorest among them owning five or six yak cows, a few bulls, and from twenty to thirty of each of sheep and goats. The wild yak of the country is always black, and much larger than the tame species. Both kinds are covered with long hair, at the roots of which large quantities of a description of soft wool, like soft downy moss, grow. This wool is extensively used in weaving blankets and making ropes. The goats of the country are the celebrated shawl-goat, which are found all over the region from the Pangong Lake to those of Manasarowar. The wool finds its way chiefly into Gartok, where the Kashmiri traders buy it up, a considerable quantity being brought to Amritsar in the Punjab. Lower down the basins of the Indus and Sutlej rivers, a mule yak, a cross between the ordinary cow of the lower Himalayas and the yak, generally known as the zibu, zoba, or jibu, is principally employed for baggage and agri-

cultural purposes. The yak itself is incapable of standing the summer heat at elevations below 12,000 feet.

The inhabitants of the higher table-lands of Hundes are, generally speaking, nomads, while those residing in the vicinity of arable land, which occurs along the lower parts of the River Sutlej and its tributaries, are semi-nomadic. The dress of the former, in the case of both sexes, is a long loose tunic of sheep-skin, with the wool on. Those in better circumstances have their tunics lined with coarse broadcloth, or some similar stout stuff, imported from India. Boots, which are generally worn, are made of felt with soles of raw hide, turned up at the sides. The food of the people consists chiefly of curd cakes, the flesh of live-stock, and a very small quantity of barley meal. The principal beverage of the country is tea, and a spirituous liquor made from fermented barley is also drunk.

Mr. Ryall found that, at elevations of 15,000 and 18,000 feet, the wind blows furiously till about 2 p.m., when it acquires its greatest speed, of about 35 miles per hour. On the passes it is very little short of a hurricane. Whirlwinds sometimes occur there, but, fortunately, rarely. On the Balchidhurra Pass, a Bhotia, a few years before Mr. Ryall's visit, was lifted off the ground, carried away some 100 yards or so, and then, dropping, was dashed to pieces. The high winds on the plains of Tibet render travelling against it a most toilsome undertaking, and the observation of distant signals a very difficult matter.

The inhabitants of the districts occupying the northern valleys of the Himalayas, from Kumaon on the east to Bashahr on the west, have intimate commercial relations with those of Hundes on the one hand, and India on the other. Their districts, taken in order from the west, are Bashahr, Nilang, at the head of the Bhagirathi, in Independent Garhwál, Mana and Niti in British Garhwál, and Johar, Darma, and Byans, in Kumaon, these being also known as the Bhotia Mehals of Kumaon and Garhwál. The Bashahris are known to carry on trade between Tibet and Amritsar, Ludhiana, and Numpur, in the Punjab, the trade consisting chiefly in shawl-wool and borax, for which they bring back in return coarsely made clothes, the coarse English broadcloths and cotton goods. The Bashahris are the only inhabitants of the higher Himalayas who are privileged to travel all over Tibet without molestation on the part of the Lhasa or Chinese officials. The others are neither permitted to cross further north than Gartok nor eastward of the Mariam-la Pass. The people of Nilang differ in no way from those of Hundes. The districts of Mana, Niti, Johar, Darma, and Byans are also known as the Bhotia Mehals of Kumaon and Garhwál. These Bhotias are a people of a most enterprising character. They are of a mixed Tartar origin, the Tartar lineaments predominating. Some of the men and women are decidedly good-looking.

The roads leading through the Johar, Darma, and Byans valleys are

barely practicable. The following description of the first of the three roads leading through Milam, would apply almost equally to the other two. "It passes along the sides of a deep and stupendous gorge, overhung mostly by lofty precipices of granite. The roadway is a mere series of narrow steps built along the faces of rugged cliffs, and where the side of the latter is too smooth, the smooth intervals are spanned by narrow planks. The road is one series of ups and downs, sometimes rising to the height of a thousand feet above the river and at others descending to its bed. Fatal catastrophes along it are not uncommon. During the rains and the melting of the snow, to insecurity under foot must be added dangers overhead from avalanches and mountain slips, which bring down with them showers of large rocks. To keep such roads in a barely passable state is a matter of great toil to the Bhotias. The goods are carried on the backs of goats and sheep, on ponies, mule yaks or zobas, donkeys and mules. Often the beasts of burden, particularly the larger kind, have to be unladen and the loads carried by the men themselves, while in some instances the animals are helped over by means of slings and other contrivances. In spite of such difficulties, the Bhotia carries on a fairly remunerative trade with Hundes and Gartok."

The Bhotia also practises husbandry to a limited extent, but since the country has come under British rule, trade has become so much more secure as to pay better, and agriculture has been greatly abandoned. Of late, however, owing to borax having fallen nearly 70 per cent. in price, the people are taking more largely to cultivation.

The villages in the Bhot mehals and their cultivable lands stand at an average altitude of 10,200 feet above sea-level, and consequently little else besides very hardy cereals is cultivated. Wheat is only sown "on chance," and often gets destroyed by early frosts before reaching maturity. Several vegetables are cultivated, and the gooseberry, red and white currants, raspberry, and strawberry are indigenous.

The inhabitants of the Mana Valley and of Nilang deal principally in salt, blankets, and yaks, in exchange for which they give grain. The well-to-do traders of all the above-named valleys bring English piece goods, broadcloths, Delhi-worked brocades, real and imitation gold and silver-lace, precious stones, &c., and resort during the beginning of September to the fair at Gartok, where they find a ready sale for such articles.

The Bhot valleys of Kumāon and Garhwāl have from a very remote period been colonised by emigrants from Tibet, and were in those days considered as part of Tibet. From the circumstance, however, of their residing longer among the lower hill tribes than among the Hunias, the Bhotias are gradually beginning to lose all knowledge of the language of their mother-country, very few Tibetan words being now used by them. The women especially are almost entirely ignorant of Tibetan.

Until quite recently, the Bhotias enjoyed an immunity from the side of the British Government from all taxation, but now, owing to their increased prosperity, they are assessed, but very slightly.

The dress of the men of the Mana, Niti, and Milam valleys, consists of a long tunic made of home-spun serge (*puttu*), and trousers of the same material; round their waist they wear cotton cloth tied in folds, and for a head-dress, a turban tied over a skull-cap. Both the men and women are extremely fond of ornaments, which in the case of the latter, consist of large solid rings of silver, called *malas*, worn round the neck, necklaces of silver chain and of coins strung together, bangles, festoons of small silver coin suspended from the hair on to the forehead, earrings and nose-rings. Some of them really carry an astonishing weight of silver.

The Bhotias have no written religious tenets, and a few of the Buddhist superstitions still linger among them. On the whole they abide by Hindu customs of worship, though they are looked down upon by all orthodox Hindus, and celebrate all their religious holidays with feasts and copious draughts of spirituous liquors.

There are five principal passes leading into Hundes from the five different ghats in British territory, and the traffic over them can only be carried on between the 15th June and the 15th October, but they are not supposed to be open until declared so by the Lhasa Government, who first satisfy themselves as to the absence of epidemics in the ghats.

The articles of commerce brought from Hundes include gold, which is produced from the gold-fields at Thok Jalung (about 100 miles north-east of Gartok), and which exists also about the Sulej Valley in Hundes, and in large quantities along the shores of the Manasarowar lakes, but very little of which finds its way to India. The export of shawl-wool (*pashm*) to India has fallen off, but it is capable of much enlargement, so much so, that the Bhotia traders say that if they could but get a sufficient sale for pashm in the North-West Provinces they would not care for the depression in the borax trade. The finest pashm is to be had in the neighbourhood of the Manasarowar lakes; the greatest portion of the product is taken to Gartok, where the Kashmiri merchants from Ladakh buy it up for the Kashmiri manufactories. Sheep's wool is almost entirely exported to the north and midland districts of the Himalayas, the people of which manufacture it into blankets and serges for home consumption. Tea, which comes only from Lhasa, principally finds its way to the Central Asian markets. Ladakh and Kashmir. A little of it goes to Amritsar, where the Kashmiris resident there chiefly consume it, and some of it is also purchased by the Bhotias, who prefer it to the Indian varieties. A similar prejudice against Indian teas is entertained by the natives of Hundes, and this prejudice is kept alive by Chinese officials, who are extremely jealous regarding the introduction of the Indian teas into Tibetan markets, and who impose a

fine on any trader found trafficking in Indian teas. Tea is one of the principal sources of income to the Lhasa Government, and it is not surprising to find them guarding their trade in this article with jealous caution. There are eight varieties of tea which are all said to come from China, and the price of which at Gartok ranges from 1 to 8 rupees. Horses are bred in large numbers in Chumurti, Tsaparang, and Rudok. They are of small stature, seldom exceeding thirteen hands, remarkably sure-footed, being able to climb about the hill sides almost as well as goats, and they find a ready sale at prices varying between 100 and 400 rupees, at the different hill stations, such as Almora, Ranikhet, Naini Tal, Massuri (Mussoorie), and Simla. Shawl-wool goats are brought into the Himalayas at the rate of about 3000 to 4000 annually, and mostly sold to the Hindus for sacrificial purposes. Their export would be greatly diminished had a larger demand for their wool existed in the North-West Provinces. Salt and borax may be had for the mere digging in the neighbourhood of the gold-fields of Thok Jalung. Broadcloth fetching 1 rupee 4 annas to 4 rupees 8 annas per yard is in large demand at Lhasa, as well as cotton goods of all kinds. For indigo there is a lively demand in the markets of Shigatze and Lhasa.

Turquoises are supplied from Yarkand, Khotan, &c., through the Ladakhi traders, and also in small quantities from India. Rubies in small numbers, and occasionally a few emeralds, find their way into Eastern Tibet. Corals and pearls of inconsiderable value are also in some requisition among the better classes of women all over Tibet. Silver in British-Indian coin, chiefly as ornaments, is in much request in Eastern Tibet, but the Bhotias cannot indulge the taste of the Tibetans in this, except to a limited degree, exchange for grain being much more profitable.

The second Trans-Himalayan exploring narrative in the New Indian Survey Report relates to Mr. T. Kinney's researches while surveying the western sources of the Ganges from Nilang up to the main watershed of the Himalayas, and thence fixing as many points beyond the frontier as possible, and sketching the district of Tsaparang or Chuprang in Hundes.

Mr. Kinney left Nilang on the 4th September, carrying his supplies on the backs of sheep and goats, and three days later reached a point about 10 miles from the Tsang-chok-la, the eastern of the two passes at the head of the Nilang Valley. Here opposition began to be raised by the Hunias to the further progress of Mr. Kinney and his duffadar, but the former was undeterred and visited three stations over 19,000 feet high. Out of regard to the safety of the coolies, Mr. Kinney could never encamp higher than 14,000 or 15,000 feet, so at most of the stations an ascent of over 4000 or 5000 feet was involved before observations could be commenced.

The features of the Nilang Valley correspond with the general

physical geography of this belt of the Himalayas as observed in other valleys; the main watershed being as a rule lower, and its slopes easier than the southern and more interrupted range on which the highest groups of snowy peaks occur. The Jadh Ganga is the westernmost feeder of the Ganges, and, with exception of the head-waters of the Tons and Jumna, the westernmost drainage of the Himalayas which falls into the Bay of Bengal, the valleys beyond the western limit of the Nilang Valley draining into the Sutlej. The entrance to the Nilang Valley from Bhaironghati is through a terrific gorge, the river-bed being encompassed by snowy peaks, from 20,000 to 21,000 feet in height, towering apparently immediately overhead. The *Sangha* or spar bridge over the river in Captain J. A. Hodgson's time (1817), has been replaced by a light suspension bridge higher up over the Jadh Ganga, but as this bridge is 380 feet long, 400 feet above the water, only 3 feet wide, with a light wire rope as side railing, and sways about considerably, it requires good nerves to enable travellers to cross it. It was built by Mr. O'Callaghan, of the Forest Department, and is a triumph of amateur engineering. Above the junction of the Mana Gadh, a large glacier-fed stream, the valley gradually opens out and the hills assume a softer and more gentle aspect. The grass and heather have a peculiar sickly scent, which produces a certain sense of faintness and a total inability for further exertion in such as are peculiarly subject to its influence. Above the limit of vegetation, which is here about 17,000 feet, the hills become steeper again, and the surface a strangely confused mass of loose rocks intermixed with patches of ice and snow.

Over a spur rising to a height of about 15,000 feet, Mr. Kinney saw the Trans-Sutlej Plain, a plateau apparently sloping gently from the snow-crowned range bounding it to the northward down to the banks of the Sutlej, which are here said to be precipitous cliffs often over 1000 feet. One of the isolated peaks in this plateau fixed as K 3 rises at its western extremity boldly and abruptly to a height of about 1500 feet above the surrounding plains, sloping off gradually towards the east. From where Mr. Kinney beheld it, it bore a fancied resemblance to some monster crouched with head erect.

Passing over the detailed topography which is described by Mr. Kinney, we may notice his remarks respecting the customs of the Hunias, in the western portion of Humles. He observes they have the same uncleanly habits, the same social institutions, and the same fondness for drink as those described by Mr. Ryall. Their *chang*, a kind of beer without any bitter ingredient, is usually made from rye, but occasionally from barley, and is drunk when fresh made. They are very fond of tea, which they drink mixed with butter, and in large quantities. Brick tea is in general use throughout Tibet at about one rupee per pound, a sum considerably above its intrinsic value. The Lhasa Government force the sale of tea on their subjects by issuing a certain quantity of

it to the governor of each province, for which he has to credit them with a fixed sum. He serves this tea out to the people of his district in quantities according to the wealth and standing of the family, whether they want it or not, and fixes the price himself, which includes a large margin for personal profit. Almost every family is obliged to take some tea, the poorest only being passed over.

The Dogkwas of the Tsaparang district are nomads living entirely in tents, and owning large flocks of sheep, goats, and yaks, with which they roam about, coming up to the grazing grounds on the higher hills during the summer, and in winter descending to the Sutlej plains. They are the chief carriers of the trade of the district.

The Jadhs are professed Buddhists, in race partly Tartar and partly Bashahri, with a strain of Garhwali blood. The former element is due to intermarriage, and the latter probably to the presence of slave girls (who are nevertheless well treated) in the households of the Jadhs. The trade passing up and down the Nilang Valley is chiefly in their hands, the Kampas and a few of the Garhwalis from the higher villages also competing with them. The Kampas are the only people who are at liberty to travel all over Tibet without question. The chief export over the frontier is grain; the imports are salt, wool, pashmina, yellow arsenic, and a few pieces of pattu. No gold or borax is imported. The estimated value of the trade across the passes at the head of the Nilang Valley is from Rs. 25,000 to Rs. 30,000 yearly. The Raja of Tihri formerly levied an *ad valorem* duty of one anna in the rupce on all imports (= $6\frac{1}{2}$ per cent.). In 1878, however, a new impost of about 20 per cent. on the salt was levied, and the effect of this on the trade is described as most disastrous, the Jadhs having had to borrow money to defray the same.

GEOGRAPHICAL NOTES.

The East African Expedition under Mr. Keith Johnston left the coast for the interior on the 19th May. Up to the eve of starting, the leader reported that all was going smoothly and satisfactorily. The Sultan of Zanzibar had been most gracious, and Dr. Kirk had given throughout his powerful aid in facilitating all the arrangements of the expedition. The party, consisting of 138 natives, besides the leader and his companion, were conveyed from Zanzibar to Dar-es-Salaam on the 14th in the *Star*, one of the Sultan's steamships, placed at Dr. Kirk's disposal for the purpose. Thus the danger and inconvenience of a dhow passage were avoided, and men and goods landed with great ease and comfort. Dr. Kirk, who accompanied them to the mainland to ensure them a fair start, reports that from all he could learn at Dar-es-Salaam Mr. Johnston commences his journey under the most favourable combination of circumstances possible, and will within a few days enter a new

and interesting region. For the first ten or fourteen marches he would follow a south-westerly course, so as to reach the junction of the two streams Ruaha and Uranga or Ranga, which united become the River Lufigi; he will then endeavour to follow the Uranga (the main stream), said to be navigable as far as the mountains. Hitherto, Dr. Kirk adds, many difficulties have stood in the way of this region, rich in cattle, grain, and ivory, being opened up, but at present there is every prospect that the powerful tribes in the plains will be willing to receive travellers, and thus the road as far as the further limits of Ubena will be found open.

Being again at Dar-es-Salaam on the 1st of June, directing the landing of the Indian elephants sent by the King of the Belgians, Dr. Kirk found that no news whatever had been received of our expedition, which he interpreted as meaning that all has gone well, and that the party are now far on their way.

Scientific Instruction to Travellers.—It has been decided by the Council not to continue the science lectures, which have formed part of the programme of the Evening Meetings of the Society during the last three Sessions. In order to meet, in some measure and in another way, the want which these lectures were intended to satisfy, that is, to give a more scientific direction to geography, the Council have arranged to provide means of instruction and training for intending travellers. At present the instruction will be limited to the use of instruments for survey and astronomical observation, and route-mapping; the extension to other branches of scientific work properly belonging to intelligent exploration, being reserved for further consideration. Inquiries as to terms, &c., are to be addressed to the Secretary.

The Algerian Missionary Society's Expeditions to the Lake District of Equatorial Africa.—Early last year Mgr. Lavigerie, Archbishop of Algiers, was charged by the Holy See with the superintendence of the arrangements for the foundation by the Algerian Missionary Society of two great missions in Equatorial Africa, the one to have its centre on Lake Tanganyika, and the other on Lakes Victoria and Albert. Père Livinhac was appointed superior of the latter mission, and Père Pascal of the former, with instructions also to make preparations for the establishment of a mission in Muata Yanvo's country, upwards of 600 miles west of Lake Tanganyika. The expedition consisted of twelve missionaries; and Père Charmetant, Procureur-Général of the Society, together with Père Deniaud, left Marseilles on March 24th, arriving at Zanzibar on April 29th, in order to make the necessary arrangements for the departure of the caravans. The remainder of the party arrived at Zanzibar about a month later; and so successful had Père Charmetant been in the organisation of the double caravan, that they were able to leave Bagamoyo for the interior on June 16th, it being arranged that they should separate in Unyanyembe for their respective destinations. In passing through

Ugogo, the expedition suffered very severely from the exactions of various petty chiefs—a fact which they attribute to the profuse and unwise liberality of previous travellers—and it was found necessary to forward a large amount of additional supplies from Zanzibar. The Tanganyika party also experienced a great loss through the death by fever of their superior, Père Pascal, at Mukonduku, on August 19th. After the expedition entered Unyanyembe matters went more smoothly, and Père Livinhac's party appear to have left Tabora for Lake Victoria and Uganda at the end of November, while the Tanganyika detachment started for Ujiji on December 4th, a few days behind the Abbé Debaize. About two months since, Mgr. Lavigerie received intelligence of the arrival of both parties at their final destinations. It may be of interest to mention that a full and detailed account of the events of their journey from the commencement is now in course of publication in '*Les Missions Catholiques*.'—Another expedition of missionaries belonging to the same society has been for some time engaged in making preparations to start for Zanzibar and the interior of Africa, and it was expected that they would leave Algiers at the end of June. They are to be accompanied by several ex-pontifical Zouaves; boats for the navigation of the lakes have been specially constructed at Algiers, and will be taken out in pieces; mules have been purchased, and are to be sent on to Zanzibar; and it is even stated that the expedition will be supplied with Indian elephants. The King of the Belgians has taken much interest in this new expedition, and has invited six of its members to spend some time in Belgium previous to their departure for Eastern Africa.

A reported Troglodyte City in North-western Arabia.—Mr. M. C. Doughty has recently communicated to the Bombay branch of the Royal Asiatic Society a brief account of a visit to the so-called rock city of El-Hejjer, which lies upon the Haj road, in Arabia, at twenty camel journeys distance from Damascus, and about which fantastic stories are current among the Arabs. In the days of Ptolemy, who calls it Egra, the place was an emporium on the trade road of gold and frankincense to Syria. Having got there after great fatigue, Mr. Doughty found the fabled seven cities of the Arabs, said to be hewn in so many mountains, to be about a hundred funereal chambers excavated in the sandstone rocks. The city appears, by the traces remaining of foundations, to have been a cluster of four or five palm villages in clay, each surrounded by a wall in the ordinary Arab fashion. In their interiors, the funereal monuments are plain sepulchral chambers with sunken tombs in the floor and recesses, while in the walls are shallow shelves of a man's length. Inscriptions are seen handsomely engraved in a panel above the doorways in many of the monuments. Above these, again, in the nobler monuments there is very commonly the thick figure of a bird with outstretched wings. The Arabs say it is a buzzard or a falcon, but Mr. Doughty suggests that the effigies are those of the mortuary owls of

the old Arabians. Mr. Doughty's visit has disposed of the singular fables propagated by the Arabs as well as by Turkish and Persian pilgrims, and which he says have been accepted in some works of learned Orientalists in Europe.

Severtsoff's Exploration of the Pamir.—M. Severtsoff, the eminent Russian geological explorer, has contributed to the 'Turkistan Gazette' an interesting account of his recent examination of some of the lakes of the Pamir, and of his views concerning the much-debated meridional mountain range on its eastern confines. From the banks of Lake Rang-kul, M. Severtsoff could see the lofty mountains in question, and in regard to their true configuration he is inclined to disagree both with Hayward and Fedchenko, the first of whom believed them to form a continuous north and south range, and the second, to be simply the bluff escarpment of a table-land. M. Severtsoff (like M. Mushketoff, apparently), looks upon them as extensive highlands covered with a somewhat complicated system of mountain ranges.* Another geographical point of importance examined by M. Severtsoff, and settled rather more conclusively than the last, was the question of the double outlet of Lake Kara-kul. The Chinese pilgrim Hwen Tshung, it may be remembered, states that the lake discharges its waters westward into the Po-tsu (probably Oxus), and eastward into the Sito (Tarim). This was a practical impossibility, but to ascertain the true state of the case appears to have been a difficult matter. The English expedition under Captain Trotter was unable to reach Kara-kul, and Kostenko, who visited it in 1876, reported positively that it had no outlet. It now seems that the old Chinese traveller was not far wrong, for from a detailed examination Severtsoff arrived at the conclusion that the supposed enclosed basin of the Kara-kul is but a central expansion of a very long valley opening at both ends; on the north-east to the Koh-sai affluent of the Kashgar River, and on the south-west to the Ak-su, the northern affluent of the Oxus, and that originally there had been outflows in both directions (though probably not simultaneously). The lake is much smaller now than formerly, and the north-eastern outflow has ceased, though there is one occasionally to the south-west, but not annually as supposed by Colonel Gordon.

Tidal Observations in India.—Captain A. W. Baird, R.E., the officer who is to supervise the new arrangements for Indian tidal observations, has inspected Aden, Karachi, Bombay, Karwar, Beypur, Paumben, Madras, and Vizagapatam, and at each of these ports, with the exception of the last two, arrangements have been made for the institution of accurate observations, and a man placed in charge of the instruments. This functionary is taught to read the graphic delineation of the tidal

* This, we presume, means that he was not close enough to study the orography, which, at a distance, looked to him confused.

height, to enter the value for each hour, and to despatch the tabular report daily by post to Puná (Poonah), Captain Baird's head-quarters. From these tidal registers it will be Captain Baird's duty to calculate the tidal elements for each port. When once the tidal elements for any place have been determined, curves, representing the momentary variation in the height of the sea-level during any required period, may be constructed graphically with the aid of a tide-calculating machine, such as has been recently constructed for the Indian Government by Mr. E. Roberts, of the Nautical Almanac Office. In connection with these tidal observations, spirit-levelling observations are being carried on in India, partly with the object of connecting the different tidal stations and ascertaining whether there is any appreciable difference of level in the mean sea-level at the several places, and partly for the purpose of connecting together and reducing to a common datum the several hitherto isolated systems of levels which have been executed throughout the country for canals, railways, and other engineering works.

The Island of Hainan and Gulf of Tongking.—The following observations, having reference to the Island of Hainan and Gulf of Tongking, have been forwarded by Captain R. H. Napier, R.N., to the 'Government Gazette' of Hong Kong:—Hoihow Fort A, N. lat. $20^{\circ} 3' 13''$, E. long. $110^{\circ} 19' 3''$. Customs' Flagstaff at Pakhoi, N. lat. $21^{\circ} 29'$, E. long. $109^{\circ} 6' 6''$. Summit of Guie-chow Island, N. lat. $21^{\circ} 1' 15''$, E. long. $109^{\circ} 6' 31''$. Cape Cami, N. lat. $20^{\circ} 11' 58''$, E. long. $109^{\circ} 54' 57''$ (approximate). North Taya Island, N. lat. $19^{\circ} 58'$, E. long. $111^{\circ} 16'$.

Congress of French Geographical Societies.—The second Congress of the Geographical Societies of France will be held in August at Montpellier, where also the French Association for the Advancement of Science is to assemble in the same month. During the session of the Congress a geographical exhibition will be held. The programme of the subjects to be discussed by the Congress, which are arranged under three headings—Physical Geography; Political, Historical, and Pre-historical Geography; and Economical and Statistical Geography—is as follows:—

1. (i.) Les cordons littoraux et en particulier les cordons littoraux Méditerranéens.
- (ii.) La végétation à Montpellier et dans les Cévennes dans ses rapports avec la nature du sol. (iii.) Étude de la succession des plantes sur le littoral Méditerranéen.
- II. (i.) Faire connaître les vestiges laissés par les populations qui se sont succédées dans le midi de la France avant l'occupation Romaine, et des traces du culte des divinités en usage dans cette région au moment de cette occupation. (ii.) Rechercher notamment les traces des établissements fondés par les Grecs, les limites de leur commerce en Gaule et les souvenirs qui restent de leur passage, de leurs relations, et de leur influence dans les inscriptions, les médailles et les noms de lieux. (iii.) Quel secours la connaissance des anciennes divisions ecclésiastiques de la France peut-elle fournir pour l'étude comparée des anciens *pagi* et des pays de l'époque postérieure, et la division en provinces sous Constantin?—III. (i.) Montrer

combien le climat Méditerranéen est différent de celui des autres régions; étudier les conditions que ce climat impose à l'agriculture. (ii.) De l'importance géographique de l'étang de Thau, au point de vue industriel. (iii.) Unification des tarifs de chemins de fer. (iv.) Établir quels sont aujourd'hui les rapports de la statistique avec la géographie.

A Geographical Societies' Annual.—MM. Paul Dreyfus and Armand Lucy, of the Société des Études Coloniales et Maritimes at Paris, propose to undertake forthwith the publication of a 'General Year-Book of Geographical Societies.' The work is to contain, each year, the regulations of each society, a list of its members, and an analytical *résumé* of its work during the preceding session. In the case of foreign societies, however, on account of space, they will publish full lists of members only in cases of special agreement, confining themselves otherwise to the names of the persons who compose the governing bodies. The general body of the work will be preceded by a brief account of such occurrences during the previous year as are of interest to geographers, together with biographical and obituary notices.—The editors request that all communications on the subject of this work may be addressed to M. Armand Lucy, 10 Cité Trévisé, Paris.

Obituary.

Captain Charles G. Constable, of the late Indian navy, who earned an honoured name as a naval surveyor in the East, died on the 18th of March last. He was the second son of the celebrated painter, John Constable, R.A.; and was born in 1821. The irrepressible desire and determination of the boy to become a sailor were displayed from his childhood; he seemed, indeed, to have been born a sailor as certainly as his father was born a painter. It cost the gifted parent many a pang to overcome the repugnance he felt to such a destiny for his son, but he found it fruitless to oppose it, and placed him under the care of Captain Hopkins, of the *Buckinghamshire*, East Indiaman, in 1835. The sentiments of the father on the occasion are portrayed in a touching passage in one of his letters given in Leslie's *Life of Constable*. The passage runs: "I have done all for the best, and I regret all that I have done, when I consider that it was to bereave me of this delightfully clever boy, who would have shone in my own profession, and who is now doomed to be driven about on the ruthless sea." The son, indeed, showed great artistic talent as a boy, and drew and etched beautifully.

Constable appears for the first four years, i.e. from 1835 to 1839, to have served in trading East Indiamen belonging to the Company. In 1839 he joined the Indian navy. At first there was no opportunity for the exercise of his ability as surveyor and draughtsman, as the surveying operations of the Indian naval service were suspended between 1839 and 1844. But he was actively employed in other duties, and before he had been long in the service was entrusted at a critical time with the command of a schooner, the *Mahi*, in the Persian Gulf. In 1844 he was attached to the Surveying Department, and in that and the following year assisted Captain Sanders in the survey of the coast of Arabia. In the latter part of 1849 and early part of 1850 he was selected by Sir James Outram to aid him, by making maps, in the important secret service in which the latter was engaged in Egypt, receiving

the thanks of the Indian Government for the service he then rendered. The subsequent years, down to 1856, were diligently employed surveying on the western coasts of India, during which long-continued and responsible service he was specially complimented for his zeal and ability by his commander-in-chief. A series of deep-sea soundings from Angrias Bank to Cape Comorin, which he had commenced, were interrupted by the Persian war. His ship had to be employed on war service, and he proceeded to the Persian Gulf.

During the war, Constable made a minute survey of the harbour of Bushire and the neighbouring country. The work had to be completed within the short time the town was in our possession; he had to labour, therefore, during the hottest hours of the hot season in that burning climate, and towards the end continued the work alone after all his officers had been cast down by illness. But the survey was completed in time.

After the war, he was detained in the Persian Gulf till 1860, making a new survey of the Gulf. The new chart was completed on his return to Bombay in September of the same year. This was the first of the Indian navy surveys which was sent to the Admiralty in London after the abolition of the East India Company. The beautifully executed chart was published in 1862, and was selected by Captain Washington, the hydrographer, for placing in the International Exhibition of 1862 as a good specimen of English chart drawing.

On the transfer of the charts of the Indian navy to the Admiralty consequent on the abolition of the East India Company, Constable was engaged to draw up a Report on the state of the Indian naval survey, embracing all the coasts from East Africa to the Straits of Malacca. This proved a most useful work. He also wrote the 'Persian Gulf Pilot' for the Hydrographic Department, a work of 260 pages—full of the most accurate information, which he had been twenty years collecting.

Such were the principal achievements of our deceased associate as a practical geographer. As regards his personal qualities, the testimony of his official superiors and of all with whom he came in contact during his long service in the East, is uniform in his praise. Industrious, conscientious, modest, and loyal, he ably and faithfully performed the work that lay before him, and won the good opinions of his colleagues. He was elected a Fellow of the Society in 1861.

CORRESPONDENCE.

Survey Arrangements of the Afghanistan Expedition.

11, ST. JAMES' SQUARE, 27th May, 1879.

DEAR SIR,—In the January number of the 'Proceedings of the Royal Geographical Society,' among the Geographical Notes is a paragraph about the Survey arrangements of the Afghanistan Expedition. Allow me to supply an omission among the names of the officers employed. Captain Reginald Beavan, according to orders from the Surveyor-General of India, was sent by me to join the Quetta column, so long ago as September last, and he has been surveying with the advance guard of that column ever since. He is at present at Candahar. He was the first Survey officer selected to join the Afghan army.

I feel sure that it was purely an oversight on the part of General Thuillier, when addressing the Society at the Evening Meeting of the 24th February, and mentioning the names of the Survey officers employed with the Afghan army, that Captain

Reginald Beavan was not included. I take the liberty of noticing the omission, for Captain Beavan during the past seven or eight months has done a great deal of valuable work.

I think, too, Mr. George Batley Scott ought not to have been omitted. He is well known on the north-west frontier, and his name has been in the mouth of everyone connected with Sir Samuel Browne's force. He has surveyed a large extent of unknown country, and been conspicuously mentioned for gallantry on more than one occasion. In fact, had he not been a civilian he would have been decorated with the Victoria Cross. In 1868, the Punjab government presented this gentleman with a purse and a sword of honour for his bravery while surveying near the Black Mountain in the Hazara district of the Punjab.

You will perhaps insert this letter in your next number.

H. L. JOHNSTONE, Major-General.

Late in Charge of Survey North-West Frontier of India.

To the Editor 'Proceedings R. G. Society.'

Longitude of Lake Nyassa.

10, NORTH MAJOR PLACE, EDINBURGH,

June 5th, 1879.

MY LORD,—I have only lately received my copy of the 'Proceedings' in which are printed the two interesting papers on Lake Nyassa, supplied by Dr. James Stewart and Dr. Laws. I shall feel much obliged if you will allow me through you to communicate to the Society one or two remarks in connection with the lie of the greater axis of the lake, and the longitude of its northern extremity. As to my observations, and those of my fellow-worker Mr. Hoste, I most readily allow that they may be proved inaccurate by future travellers—a fate that has befallen explorers before now. But until such future travellers shall have confronted my observations with others taken on the spot, I do not see why I should not, with all due admission of fallibility, trust the results that I obtained. Let them at all events have the credit of being what they are, not negative theories, but the only evidence of a positive character that exists.

In 1876, I took up to the Nyassa (besides two pocket chronometers, one of which was lent me by the Royal Geographical Society) a ship's chronometer, which I purchased from one of the officers of the ill-starred *Windsor Castle*. Stowed away in a strong box, which was slung on a pole and carried by two men across the Cataract country, that chronometer reached the lake in safety, and I ascertained by it the longitude of Livingstonia, finding my result tally almost exactly with that given by Livingstone.

I ascended the lake (1877) in my boat, the *Herga*, as far as Mankambira's, and took observations for longitude by means of the pocket chronometers, correcting them on my return by means of the known longitude of Livingstonia. These, I believe, are the only observations by chronometer taken on Nyassa—if not the only longitude observations of any kind—since the time of Livingstone at all events. As to our last journey, the lunars taken by Mr. Hoste (an officer of the Union S. S. Company, and an experienced observer), and by me in Konde and Usango, are the sole results that have ever been obtained in the vicinity of the north end. The Mission party attempted none. Consul Elton himself was no observer, and merely incorporated in his map the results of our sextants, as well as those of our compasses and

aneroids. The place at which Mr. Hoste took the most trustworthy series of lunars was Mazote's Pass. The extreme results varied from $33^{\circ} 55'$ to $34^{\circ} 25'$. Consul Elton accepted the westernmost, while I went too far towards the other extreme. The true longitude perhaps lies between the two. In his map Elton afterwards (south of Uwambara), had to give our route an easterly trend, unwarranted by my compass observations and dead-reckoning, in order to make up for his error.

Even thus the difference between our longitudes of the Ruambadzi (Rombashe) (as given in the maps published with his journals) is only $25'$.

I am, &c.,

H. B. COTTERILL.

To the President of the Royal Geographical Society.

THE ANNIVERSARY MEETING, MAY 26TH, 1879.

Sir RUTHERFORD ALCOCK, K.C.B., Vice-President, in the Chair.

ELECTIONS.—*Edward J. Bartlett, Esq.; Colonel Edward Hy. Clive; Alfred Clayton Cole, Esq.; Rev. Robert Eden; Samuel Green, Esq.; Sir Jno. Alexander Hanham, Bart.; Julian A. H. Louis, Esq.; Harry Courtenay Luck, Esq.; Samuel E. Peal, Esq.; Sir Samuel Wilson.*

The proceedings commenced by the reading of the Section of the Regulations of the Society governing anniversary meetings, by the Secretary, Mr. C. R. Markham.

The Rev. C. Heaven, M.A., F.R.A.S., and Professor Tennant were appointed Scrutineers of the ballot about to take place.

Mr. MARKHAM then read the Annual Report of the Council as follows:—

REPORT OF THE COUNCIL.

The Council have the pleasure of laying before the Fellows the customary Annual Report on the financial and general condition of the Society:—

Members.—The number of Fellows elected during the past year (ending April 30th, 1879) was 170, besides two Honorary Corresponding Members. In the previous year, 1877–78, the total elections of Fellows numbered 187. In 1876–77 the number was 292, and in 1875–76, 266. The losses in the past year have been, by death 80, by resignation 54, and by default of subscription 34, making the net increase for the year, two. In the year 1877–78 the net increase was 49; in 1876–7, 138; in 1875–76, 149; and in 1874–75, 202. The Society has also lost by death three Honorary Corresponding Members.

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the Financial year ending 31st December, 1878 (exclusive of balance in hand), was 8124*l.* 10*s.*, of which 6017*l.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1877, the total net income was 7950*l.* 1*s.* 11*d.*, and the amount of subscriptions, &c., 6099*l.*; in 1876, 8611*l.* 11*s.* 8*d.* and 7109*l.* 11*s.* The amount of total net income just stated for the past year included a legacy of 540*l.* from the late Admiral Sir George Back. A legacy of 500*l.* formed also part of the stated income for 1877.

The net expenditure for the past year (exclusive of investments and balance in hand) was 6361*l.* 9*s.* 6*d.*; which includes a grant of 500*l.* to the African Exploration Fund. The net expenditure in 1877 was 5940*l.* 17*s.* 11*d.*; in 1876, 6870*l.* 13*s.* 1*d.*; and in 1875, 5683*l.* 4*s.* 10*d.* The sum of 3000*l.* was invested in Consols during the year.

<i>Receipts.</i>		BALANCE-SHEET FOR THE YEAR 1878.				<i>Expenditure.</i>			
1878.		£	s.	d.	£	s.	d.	1878.	
<i>Balance in Bankers' hands 31st Dec. 1877 (deducting Cheque not presented)</i>		2,210	17	0				<i>House:—Taxes and Insurances, Repairs, Improvements and Furniture, Coal, Gas and Water-rate, &c. . . .</i>	.. .. 502 8 5
<i>Do. Accountant's do.</i>		16	7	1	2,257	4	1	<i>Office:—Salaries and Gratuties, Stationery and Printing, Postages and Parcels, &c. . . . .</i>	.. .. 1,712 13 0
<i>Subscriptions:—</i>								<i>Library:—</i>	
<i>For the current year ..</i>		3,820	0	0				<i>Salaries, Books, &c. . .</i>	.. .. 503 2 3
<i>Paid in advance</i>		522	0	0				<i>Map-Room:—</i>	
<i>Arrears</i>		594	0	0				<i>Salaries, Gratuties, &c. . .</i>	.. .. 858 15 7
					4,936	0	0	<i>Meetings .. .. .</i>	.. .. 235 6 0
<i>Entrance Fees</i>					531	0	0	<i>Scientific Purposes</i>	
<i>Life Compositions</i>					550	0	0	<i>Grant:—</i>	
<i>Subscriptions paid in error</i>					74	2	0	<i>Lecturers' Fees, &c. . .</i>	.. .. 175 0 0
<i>Legacy by Admiral Sir George Back</i>					541	0	0	<i>Medals and other awards .. ..</i>	.. .. 106 12 0
<i>Parliamentary Grant</i>					500	0	0	<i>Publications:—Printing</i>	
<i>Royal Premium</i>					32	10	0	<i>Journal and Proceed-</i>	
<i>Rent of Shop and Cellars</i>					140	0	0	<i>ings, Maps and Illus-</i>	
<i>Publications, Sale of, and</i>					196	5	8	<i>trations, &c. . . . .</i>	.. .. 1,742 12 3
<i>Advertisements</i>								<i>Payments in error returned</i>	.. .. 25 0 0
<i>Dividends:—</i>								<i>Expeditions:—Donation</i>	.. .. 500 0 0
<i>North-Eastern Railway</i>								<i>to the African Explora-</i>	
<i>4 per Cent. Debenture</i>		39	8	4				<i>tion Fund</i>	
<i>Stock 1000l.</i>								<i>Investments:—Purchase</i>	
<i>India 5 per Cent. Stock</i>		49	3	4				<i>of 3142l. 15s. 10d. Con-</i>	.. .. 3,000 0 0
<i>1000l.</i>								<i>sols</i>	
<i>Great Indian Peninsula</i>								<i>Balance in Bankers'</i>	
<i>Railway 5 per Cent.</i>		236	3	4				<i>hands 31st Dec. 1878</i>	999 13 0
<i>Stock 4000l.</i>								<i>(excluding Draft not</i>	
<i>Great Western Railway</i>								<i>presented)</i>	
<i>4 per Cent. Debenture</i>		73	7	8				<i>Do. Accountant's Do. .</i>	20 11 7
<i>Stock 1800l.</i>									1,020 4 7
<i>London and North</i>									
<i>Western Railway</i>		39	8	4					
<i>4 per Cent. Debenture</i>									
<i>Stock 1000l.</i>									
<i>Exchequer Bills 1000l.</i>		24	12	0					
<i>Caledonian Railway</i>									
<i>4 per Cent. Preference</i>		78	15	8					
<i>Stock, No. 1 .. 2000l.</i>									
<i>Consols .. 3669l. 2s. 2d.</i>		61	13	8					
					604	12	4		
					£ 10,381	14	1		£ 10,381 14 1

REGINALD T. COCKS,
Treasurer.

Audited and found correct, the 16th day of April, 1879.

The Finance Committee of the Council have held, as usual, Monthly Meetings during the year, supervising the accounts of the Society. The Annual Audit was held on the 16th of April last, the Auditors being, on behalf of the Council, Sir Rawson W. Rawson and Sir Henry Barkly; and on behalf of the Fellows at large, Sir Charles Nicholson, Bart., and S. P. Low, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council:—

"The Auditors appointed for the examination of the Accounts of the Royal Geographical Society for the year ending 31st December, 1878, beg to report that they have examined the Balance Sheet submitted to them, and compared it with the Cash Book, Bankers' Book, Petty Cash Book, and other books of account kept by the Society, and have verified the Balance in the Bankers' Pass Book, checked the entries in the Cash Book, and examined all the vouchers for payments made, and that they have found the same to be correctly stated, and sufficiently vouched.

"They have also had produced to them a letter from the Chief Accountant of the Bank of England, and from Messrs. Cocks, Biddulph, and Co., Bankers, showing that the following investments were standing to the credit of the Society on the 31st December, 1878:—

	£	s.	d.
India 5 per cent. Stock	1000	0	0
Great Western Railway 4½ per cent. Debenture Stock ..	1800	0	0
London and North-Western Railway 4 per cent. De-			
benture Stock	1000	0	0
North-Eastern Railway 4 per cent. Dehenture Stock ..	1000	0	0
Great Indian Peninsula Railway Guaranteed 5 per cent.			
Capital Stock	4000	0	0
March Exchequer Bills	1000	0	0
Caledonian Railway 4 per cent. Preference Stock, No. 1	2000	0	0
Consols (Lambert Donation)	526	6	4
Consols	3142	15	10

"The Subscription Register, showing the sums payable by the Fellows of the Society, has been duly kept up, and the arrears outstanding at the close of the year were 1517*l.* Of this amount, the sum of 192*l.* is irrecoverable, and the Auditors include the balance of 1325*l.* in the assets of the Society as worth 612*l.* 10*s.*

"The Investments and Assets of the Society on the 31st December, 1878, exclusive of the Map Collection and Library, amounted to 37,101*l.* 16*s.* 9*d.*

"The Auditors have much pleasure in certifying that the accounts, books, and vouchers have been so kept as to render their duties much lighter than usual, and they feel bound to record their appreciation of the great assistance they received from the Chief Accountant.

"RAWSON W. RAWSON,
"HENRY BARKLY,
"CHARLES NICHOLSON," } *Auditors.*
"S. P. Low,

"21st April, 1879."

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec., 1878.

	Year.	Cash Receipts within the Year.			Cash Amounts invested in Funds.			Deducting Amounts invested in Funds; actual Expenditure.		
		£	s.	d.	£	s.	d.	£	s.	d.
	1848	696	10	5	..	..	..	755	6	1
	1849	778	3	0	..	..	..	1,098	7	6
In 1856 a Treasury Grant of 1000 <i>l.</i> for the East African Expedition received.	1850	1,036	10	5	..	..	..	877	2	10
	1851	1,056	11	8	..	..	..	906	14	7
In 1860 a Treasury Grant of 2500 <i>l.</i> for the East African Expedition received.	1852	1,220	3	4	..	..	..	995	13	1
	1853	1,917	2	6	..	..	..	1,675	6	0
In 1869 Legacy of Mr. Benjamin Oliveira, 1506 <i>l.</i> 17 <i>s.</i> 1 <i>d.</i>	1854	2,565	7	8	..	..	..	2,197	19	3
	1855	2,584	7	0	..	..	..	2,636	3	1
	1856	3,372	5	1	533	10	0	2,814	8	1
In 1870 Legacy of Mr. Alfred Davis, 1800 <i>l.</i>	1857	3,142	13	4	378	0	0	3,480	19	9
	1858	3,089	15	1	..	..	..	2,944	13	6
In 1871 Legacy of Sir Roderick Murchison, 1000 <i>l.</i>	1859	3,471	11	8	950	0	0	3,423	3	9
	1860	6,449	12	1	466	17	6	5,406	3	7
	1861	4,792	12	9	1,358	2	6	3,074	7	4
In 1872 Amount of Mr. James Young's Grant for the Livingstone Congo Expedition, 2000 <i>l.</i>	1862	4,659	7	9	1,359	7	6	3,095	19	4
	1863	5,256	9	3	1,837	10	0	3,655	4	0
	1864	4,977	8	6	1,796	5	0	3,647	7	10
In 1874 Amount of Mr. James Young's Grant for the Livingstone Congo Expedition, 1041 <i>l.</i> 14 <i>s.</i>	1865	4,905	8	3	1,041	5	0	4,307	4	5
	1866	5,055	8	3	1,028	15	0	4,052	15	0
	1867	5,462	7	11	1,029	0	6	3,943	17	4
	1868	5,991	4	0	1,857	3	9	4,156	17	10
In 1876 Special Parliamentary Grant of 3000 <i>l.</i> towards the Expenses of the Cameron Expedition.	1869	6,859	16	0	2,131	5	0	4,646	0	8
	1870	8,042	6	1	3,802	6	0	3,845	10	6
	1871	6,637	3	7	1,000	0	0	3,726	4	4
	1872	8,119	7	9	1,999	4	6	5,871	13	2
In 1877 Donation of 500 <i>l.</i> by Mr. C. J. Lambert in carrying out the provisions of his father's will.	1873	7,761	18	10	2,015	1	8	6,697	12	6
	1874	8,753	5	10	499	0	0	7,876	2	3
	1875	7,934	15	10	2,002	7	6	5,683	4	10
In 1878 Legacy of Admiral Sir George Back, 540 <i>l.</i>	1876	11,611	11	8	..	..	..	6,870	13	1
	1877	7,950	1	11	2,538	2	0	8,940	17	11*
	1878	8,124	10	0	3,000	0	0	6,361	9	6

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

STATEMENT OF ASSETS—31st DECEMBER, 1878.

	£	s.	d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000 <i>l.</i> .. }	20,000	0	0
Investments (amount of Stock), as detailed in the above} ..	15,469	2	2
Report of the Auditors }			
Arrears due on December 31, 1878 }	£1,517		
Less, irrecoverable }	192		
	£1,325		
Estimated at }	612	10	0
Balance at Bank }	999	13	0
.. in Accountant's hands }	20	11	7
	1,020	4	7
Total }	£37,101	16	9

Publications.—A new form of publication of the ‘Proceedings’ of the Society was commenced in January of the present year, the old ‘Proceedings’ terminating with the 22nd volume. The new series is a monthly publication, containing besides the chronicle of the proceedings of the Evening Meetings, numerous maps, and a record of Geographical events throughout the world, together with notices of new books and maps published in various countries. The numbers have hitherto been issued with punctuality on the 1st of each month, and at the end of the year the twelve parts will form a large volume, a complete Index being issued as soon as practicable after the last number. Although attended by a considerably increased expense, the Council have felt assured from the commencement that the new publication would meet with the warm approval of the Fellows. The expense is counterbalanced to a larger extent than was originally estimated, by receipts from advertisements and from sales to the public, upwards of 800 copies being subscribed for by persons who are not Fellows of the Society.

Expeditions: Grants of Instruments to Travellers.—A second grant of 500*l.* was made during the year 1878 to the African Exploration Fund.—Instruments at a total cost of 357*l.* 18*s.* have been supplied to travellers, as follows:—Mr. Keith Johnston (for the East African Expedition of the African Exploration Fund), a complete set, value 170*l.*; Mr. Henry Forbes (for his journey to Celebes), instruments to the value of 9*l.*; Mr. Simons (for the Exploration of the Sierra Nevada of Santa Martha), instruments to the value of 15*l.*; Mr. Comber (Expedition to the Congo), instruments to the value of 57*l.*; Dr. Mullens (for Lake Tanganyika), instruments to the value of 101*l.*; Captain A. H. Markham, R.N. (voyage to Nova Zembla), instruments, value 5*l.* 18*s.* The instruments lent to Mr. Craven (East Africa) and Lieut. Congreve (Paraguay) have been returned into store, on the termination of the journeys of these travellers.

Annual Grant for Scientific Purposes.—The science lectures appointed by the Committee charged by the Council with the administration of the annual grant of 500*l.* for scientific purposes, have been continued during the past year; but only a portion of the grant, viz. 175*l.*, was expended. The following gentlemen were chosen to deliver the three lectures for the Session 1878–9:—Professor A. Geikie, subject, “Geographical Evolution”; Professor Rolleston, subject, “The Modifications of the External Aspects of Organic Nature produced by Man’s Interference”; and J. Ball, F.R.S., subject, “The Flora of the European Alps and its connection with that of other regions of the Earth.” The large MS. Map of Equatorial Africa, with Bibliographical list of authorities, the compilation of which was entrusted by the Committee to the well-known geographer Mr. Ravenstein, is making steady progress.

Library.—641 books and pamphlets have been added to the Library during the

past year; 473 (including all the pamphlets) being donations, and 168 purchased. Besides these, and without reckoning such publications of general interest as the 'Athenæum,' &c., 1102 separate parts or numbers of periodicals, 'Transactions,' &c., have been received (including those obtained by gift in or towards completion of defective series), many of which complete annual or other volumes.

136 pamphlets and small works have been put into covers on the Society's premises, and 263 volumes have been bound during the past year.

The sum of 136*l.* 17*s.* 5*d.* has been expended in purchasing books, and the further sum of 87*l.* 0*s.* 6*d.* in binding.

Among the more important accessions are:—Gaimard's 'Voyage en Laponie' and 'Voyage en Island'; and Du Petit Thouars's 'Voyage de la Vénus,' with Atlases complete; Brosset's 'Description' and 'Histoire de la Géorgie'; Texier's 'Description de l'Arménie'; Cartas de Indias (presented by the Conde de Toreno, through H.E. the Spanish Minister); Vander Aa's Collection of Sea and Land Journeys in the East and West Indies, in Dutch, 27 vols. (presented by C. R. Markham, Esq.); Juan and Ulloa's 'Observaciones Astronomicas y Phisicas' (presented by J. P. Gassiot, Esq.); Sir J. Maundevile's 'Voiage'; Gerritsz's 'Detectio Freti Hudsoni'; Bruce's 'Annals of the East India Company'; Heeren's Political and other Works; the continuation of Burgess's 'Archæological Survey of Western India,' and Rice's 'Mysore and Coorg,' with many other official publications referring to India (presented by Her Majesty's Secretary of State for India); 'Encyclopædia Britannica,' 9th edition, vols. viii. and ix. (presented by Messrs. A. and C. Black); 'Œuvres de Champlain,' by Laverdière; Wild's 'At Anchor' (presented by Messrs. Marcus Ward and Co.); a collection of the chief works referring to Arctic Voyages (presented by the Rev. H. Back); a collection of Dutch writings by Professor Veth on the Indian Archipelago (presented by the Author, per P. Bicker-Caanten, Esq.); collection of Geographical Addresses by the late Sir Roderick Murchison (presented by Kenneth Murchison, Esq.); Kanitz's 'Donau-Bulgarien'; Paz Soldan's 'Diccionario Geografico del Peru,' with various writings on South America, by Vicuña Mackenna, Raimondy, &c. (presented by Señor M. F. Paz Soldan); the completion of Sir H. Lefroy's 'Memorials of the Bermudas' (presented by the Author, per Messrs. Longman); Fouqué's 'Santorin et ses Éruptions'; Thomson's 'Through Cyprus with the Camera'; the current reports and other publications of the U.S. Geographical Survey under Professor F. V. Hayden (presented by him); various publications of the Egyptian General Staff (presented by General Stone); the continuation of the Memoirs and other publications of the Geological Survey of India (presented by the Indian Government, per Dr. Oldham); the continuation of vol. iii., and the whole of vol. iv. of Reclus's 'Géographie Universelle' (presented by the Author); and all as yet published of St. Martin's 'Géographie Universelle.'

The Library continues to be much consulted by Fellows of the Society and officers of public departments. Reference is also constantly being made to it by students, authors, and artists connected with publishing establishments.

Map-Room.—The revision of the classified Register of Maps, and the preparation of an alphabetical catalogue of all the Maps in the Society's Collection, with an index of authors, were decided upon at the Council Meeting of June 3rd, 1878; since which time considerable progress has been made in this work, and the new catalogue is being prepared with a view to its being subsequently printed.

The Council have voted 50*l.* per annum, for four years, to be expended in putting the bindings of the Society's Atlases in good order, and the shelves on which the Atlases are kept have been covered with sliding sashes for their better preservation.

The offer of Messrs. Lund and Bloekley, to provide the Map-Room with a

Synchronising time current has been accepted by the Council, and an hourly mean time current is now received in the Map-Room. A case containing a set of traveller's instruments (such as the Society recommend) has been placed in the Map-Room.

Great interest has been evinced by the Fellows of the Society and the general public in the Maps of the Seat of War in Afghanistan, and South-East Africa. Public officers, students, and the public have made frequent use of the Maps in the Society's Collection. The large Maps have been lent during the year, for the purpose of illustrating many geographical lectures in different parts of the kingdom.

The accessions to the Map-Room Collection since last Anniversary, comprise 468 Maps and Charts on 1426 sheets; 24 Atlases containing 790 sheets; and 133 Photographs. Of these, 50 Maps and 4 Atlases have been purchased. Five new diagrams (Cyprus, South-East Africa, Southern Usambara, Cameroons Mountains, and Lake Nyassa) have been constructed on the establishment, and several others have been corrected. Three large diagrams (Afghanistan, Africa, and Asia) have been purchased. The accessions of the present year are in excess of those of last year by 17 Maps and 19 Atlases on 564 sheets.

Among the most important additions to the Map-Room are :—308 sheets of the Ordnance Survey of the British Isles on various scales (presented by the First Commissioner of Works, through the Director-General of the Ordnance Survey). 201 Charts of the British Admiralty, 1 Atlas of Index Charts and an Atlas of Pilot Charts for the Atlantic Ocean (presented by the Lords Commissioners of the Admiralty, through the Hydrographer). 95 French Admiralty Charts (presented by the *Dépôt des Cartes et Plans de la Marine*). 4 sheets of United States Charts, and an Atlas of Meteorological Charts of the Pacific (presented by Captain S. R. Franklin, U.S.N., Hydrographer to the Bureau of Navigation). 178 sheets of the various Indian Government Surveys (presented by Her Majesty's Secretary of State for India, through the India Office). 47 sheets of Maps, including 21 sheets of Major Wilson's Map of Afghanistan (presented by the Quartermaster-General). 12 sheets of the Topographischer Atlas der Schweiz (presented by the Chief of the Federal Survey, Bern). 1 Atlas over Kongeriget Denmark (presented by Rear-Admiral C. Irminger). 5 sheets of the Kaart over Jydland (presented by H.E. the Danish Minister). Geological and Topographical Atlas accompanying the Report of the Geological Exploration of the Fortieth Parallel, U.S.A. (presented by Clarence King, U.S., Geologist-in-charge). Geological and Geographical Atlas of Colorado, and an Atlas of the Geological Survey of Wisconsin (presented by Dr. S. V. Hayden). Map of the Turkistan Military Province, constructed by the Turkistan Military Topographical Department. Map showing the Explorations of H. M. Stanley (presented by Edward Weller, Esq.). Map of Madagasear (presented by Dr. Mullens). 16 sheets of MS. Tracings of the Nile Surveys (presented by General Stone). Adolf Stieler's Hand Atlas, Parts I. and II., new edition (presented by Herr Justus Perthes). 15 sheets of Maps, including two General Maps of Australia, and four of the Colony of Victoria (presented by the Honourable Graham Berry, Premier of Victoria). 1 Atlas of the Southern portion of the Province of South Australia (presented by Sir A. Blyth). 120 Photographs taken in Damaraaland and East Namaqualand, by Mr. W. C. Palgrave (presented by Sir Henry Parkes). A MS. Map of the Nile between Assouan and Wady Halfa (presented by G. Kilgour, Esq.). 40 sheets of the Special-Karte der K. u. Oesterreichisch-Ungarischen Monarchie. 17 sheets of Norwegian Surveys (presented by Lieutenant-Colonel Sejersted). 17 sheets of French Government Survey (presented by the *Dépôt de la Guerre*).

On the motion of E. Delmar Morgan, Esq., seconded by Professor Tennant, the above Report was unanimously adopted.

PRESENTATION OF THE ROYAL MEDALS.

The Royal Medals of the year for the Encouragement of Geographical Science and Discovery had been this year awarded by the Council as follows:—

The Patron's Medal to Lieutenant-Colonel Nicholas Prejevalsky, for the great additions he has made to our knowledge of Central and Eastern High Asia by his successive expeditions into the unexplored parts of the great plateau of Mongolia and the lofty deserts of Northern Tibet; in one of which—in the years 1870–73—he reached, from Kalgan, Koho-nor and the plateaux of Northern Tibet, laying down by route-survey and observations for latitude and altitude 3500 miles of previously unexplored country; and in another, 1876–77, he penetrated from Kulja to Lob-nor and the previously unknown mountain range of Altyn-Tag beyond it:—also for the admirable way in which he has described the regions and their products over which he has travelled, in the published narratives of his journeys.

The Founder's Medal to Captain W. J. Gill, R.E., for the admirable geographical work he has performed during two long journeys of exploration, voluntarily undertaken, along the northern frontier of Persia in 1873, and over previously untravelled ground in Western China and Tibet in 1877; and especially for the careful series of hypsometrical observations and the traverse survey made by him during the latter journey, by which we have, for the first time, the means of constructing with considerable accuracy profile sections of those elevated and little-known regions. Also for the elaborate Memoir of upwards of 100 pages he has contributed to the Journal of the Society on the subject of his Expedition, and for the maps of his route, in forty-two sheets, on a scale of two miles to the inch.

His Excellency COUNT SCHOUVALOFF, the Russian Ambassador, attended to receive the medal on behalf of Colonel Prejevalsky. The Chairman addressed him in the following words:—

“Russia has always been honourably distinguished for its scientific travellers, and the works that have recorded their journeys and observations, from those of Pallas in the last century down to the present day, occupy an important place in every scientific library. Our Society has watched with deep interest the progress of Colonel Prejevalsky, who is equally distinguished as a Geographer and a Naturalist; although I believe it was his enthusiasm as a naturalist chiefly which led him to undertake his adventurous journeys. But if so, there is the greater merit in his having grafted on this earlier passion all the qualifications of a scientific geographer, and a most successful and daring explorer of previously unknown regions. Our Council has unanimously awarded him the Royal Medal of this year for a series of geographical achievements, which have rendered the name of Prejevalsky so widely known throughout Europe. There were first his successive journeys in the years from 1870 to 1873 in the remote north-western corner of China, which culminated in his great push to the Koho-nor and the lofty plateaux of Northern Tibet. The journeys of these three years amounted to a distance of 7000 miles, 3500 of which were over entirely new ground, and were surveyed by the traveller. He next resolved to penetrate to the semi-fabulous lake of Lob-nor, in the heart of Mongolia, and in 1876–77 he succeeded in this great feat, passing to the south of the lake and discovering the lofty mountain range of Altyn-Tag stretching across this part of Asia from east to west. The published records of his travels in the Tangat country and in the solitudes of Northern Tibet yield in interest and importance to none that have been given to the public since the days of Marco Polo, even with all the wealth of illustration furnished by Colonel Yule, one of the most distinguished geographers of this Society. We have not, indeed, had the advantage of reading Colonel Prejevalsky's work in the original, but thanks to the labours of another

member of this Society, Mr. Delmar Morgan, and his mastery of the Russian language, it has been so admirably translated, with an introduction and notes by Colonel Yule in addition, that we have been enabled fully to appreciate the great excellence of the original. In conferring the highest honour in our power on Colonel Prejevalsky, we do not forget that he is a member of the Russian Staff Corps, to which body, and to the enlightened and generous support afforded by Russia and the Imperial Russian Geographical Society to scientific explorations, all geographers are greatly indebted. In the absence of Colonel Prejevalsky, who is still engaged in the prosecution of his arduous explorations, I am happy to be allowed to place the medal in the hands of your Excellency as the representative of Russia in this country, whose name and distinguished services in diplomacy are no less widely known than Colonel Prejevalsky's in the field of Geographical Science."

Count SCHOUVALOFF replied :—

"Sir Rutherford Aleock, Ladies and Gentlemen,—In accepting this token of the great honour which the Society has bestowed on one of my countrymen, I feel happy in being the intermediary on such a gratifying occasion. But, in expressing Colonel Prejevalsky's deep sense of gratitude for so precious an acknowledgment of his labours, I feel how inadequate must be my interpretation of the feelings of my countryman. Whilst engaged, as he now is, in the prosecution of his third arduous enterprise, which has been undertaken for an exclusively scientific purpose, Colonel Prejevalsky will no doubt regard the presentation of the medal of the Royal Geographical Society as a happy omen of success in his explorations in the highlands of Asia. It has occurred to me that the Society would be interested in learning the latest news received in Russia with regard to Colonel Prejevalsky's movements, and I will therefore ask permission to communicate the following extract from a recent letter of the traveller's. Colonel Prejevalsky, writing from Zaisan on the 1st of April last, says :—'On the 27th of February we arrived at the post of Zaisan, and I employed the last three weeks in final arrangements for the expedition. This winter's deep snows would have prevented any attempt to start earlier in the season. We leave, however, to-morrow, and march to the town of Bulukhtokhoi, thence up the Urung River, skirting the south of the Altaï Range, to Barkul and Hami, more than 1000 versts from Zaisan; we hope to arrive there at the end of May. If the hot weather and the drought do not absolutely prevent us from crossing the Hami Desert, we shall at once proceed onwards to the town of Su-chau. Thence we have to ascend to the highlands forming the first ridge of the table-land of Tibet, and upwards to the Tibetan heights. This latter country—an absolute desert tenanted by wild herds—we have to cross in its full length, about 1000 versts, before we reach Lhassa, the object of our expedition. After halting there some time, I hope to explore South-Eastern Tibet, and taking again Lhassa on my return, to come home via Khotan and Kashgar. I have calculated that the expedition will take two years. Such, in general, are my plans, but facts will show whether they are feasible. We are perfectly well equipped. I have only to wish we may enjoy good health and the same luck that has hitherto attended all my Asiatic expeditions.'"

General Sir J. Lintorn A. Simmons, R.E., G.C.B., K.C.B., attended to receive the medal on behalf of Captain Gill, who is at present on public duty in Asia Minor. Addressing him, the Chairman said :—

"Sir Lintorn Simmons,—The Council have awarded the Patron's Medal to Captain Gill for the admirable geographical work he has performed during two long journeys of exploration, which he has undertaken, not on professional duty, or at the public charge, but voluntarily, for the love of science, and at his own cost. The first journey was along the northern frontier of Persia in 1873, which

resulted in an excellent map, published by him, of a region of high political interest, regarding which very little was known. His second and much longer journey was through China from east to west, and over comparatively untravelled ground in the extreme west of that country, and the eastern borders of Tibet, traversing those little-known border regions from north to south, on to Yunnan and Burmah. During this journey he made a traverse survey of all the remote westerly region, and took a careful series of hypsometrical measurements, the result of which is, that we have now an accurate knowledge of the elevation and configuration of that great extent of mountainous country, besides a clear idea of its geography, from the admirable map in 42 sheets which Captain Gill has presented to the Society. Since Captain Gill cannot himself be present, employed as he is at this moment on public duty in the East, I am happy to place this medal in your hands, as the head of the distinguished corps of which he is a member, and no less honourably known for your valuable work in a civil capacity, in various missions both in Europe and Asia, than for your services in the field as a soldier."

General Sir LINTON SIMMONS, in reply, said he regretted exceedingly that his young friend, Captain Gill, was not present to hear the kind words which had been spoken of him, and to receive personally this mark of the high distinction bestowed upon him by the Royal Geographical Society. He himself naturally took a very great interest in Captain Gill, because that officer served under his command almost immediately after he entered the service, and since then he had watched his career, and it had been a matter of very great satisfaction to him and to all his brother officers to find that wherever Captain Gill had gone he had done his duty as a good soldier without any ulterior objects. Fortunately for the Society, as well as for himself, Captain Gill had been able by his private means to undertake the arduous journeys which had just been referred to. He had shown great courage and dexterity, and was one of the only four Europeans who had passed from China into India. That alone was a great achievement; but when it was remembered that he started as a young man alone upon that journey (though he afterwards met an Englishman who accompanied him), he thought the Fellows would all agree that he had deserved the honour which they had conferred upon him.

PRESENTATION OF THE PUBLIC SCHOOLS PRIZE MEDALS.

The medals had been awarded as follows by the Examiners, who were, for Physical Geography, Mr. J. Ball, F.R.S., and for Political Geography, the Rev. Canon Tristram: the special subject being "The Barbary States and the Sahara."

PHYSICAL GEOGRAPHY.—*Gold Medal*—Matthew George Grant, Liverpool College. *Silver Medal*—Frank Taylor Sharpe, Liverpool College. *Honourably Mentioned*—Ernest Geo. Harmer, University College School, and Hubert Llewellyn Smith, Bristol Grammar School (*equal*); Frank Stanton Carey, Bristol Grammar School; Alfred Theodore MacConkey, Liverpool College.

POLITICAL GEOGRAPHY.—*Gold Medal*—David Bowie, Dulwich College. *Silver Medal*—Claude L. Bicknell, Harrow School. *Honourably Mentioned*—Jas. Fred. Naylor, Dulwich College; Wm. Hy. D. Boyle, Eton College; and Allan Dawson Rigny, Liverpool College (*equal*); Theodore Brooks, London International College; Robert Arthur Fawcett, Clifton College; and Arnaud Clarke Painter, Clifton College (*equal*).

THE CHAIRMAN called upon Mr. Francis Galton to state the general results of the examination.

Mr. FRANCIS GALTON said, before making a brief statement of the results of the Public School Examination, he wished to point out the significance of the practice of the Society of giving their medals to Public School boys immediately after their

greater awards to the most distinguished travellers of the day. It testified to their solicitude that the results obtained by those travellers should be accurately and widely known, and should not lapse into oblivion. By rewarding on the same occasion the explorer and the schoolboy, the Society kept in full view the purpose for which it was founded, namely, the advancement of geographical science. He had to state that out of fifty-three large schools which were invited to send candidates at the last examination, sixteen had done so. For the first time Harrow, whose distinguished Head Master he was pleased to see present, had won a silver medal, and now Rugby was the only one of the great schools which stood aloof. He would further say that Dulwich had been most successful of late years. This year it had, in one of the two subjects of examination, won a gold medal and the first position among those who were honourably mentioned. Liverpool College retained its precedence. It had won two medals out of the four; and out of the forty-four that had been adjudged during the last eleven years, it had gained no less than fourteen. He would now ask one of the examiners, the Rev. Canon Tristram, to present the medallists to the Chairman to receive their awards. The gold medallist from Liverpool College was not present, but the Head Master, Mr. George Butler, would receive the medal for him.

The CHAIRMAN, in presenting the Gold Medal for Physical Geography to the Rev. George Butler, Head Master of Liverpool College, for M. G. Grant, said that the two medals now gained by his boys made the total number gained by Liverpool College, since the first institution of the Society's examinations, no less than fourteen, a number by far exceeding that attained by any other school. It was impossible not to attribute this success to Dr. Butler's own distinguished qualifications as a scientific geographer. Proofs, however, were not wanting that while his pupils were acquiring these prizes in Geography, they were by no means backward in securing distinction in other branches of their education.

In presenting the Gold Medal to David Bowie, of Dulwich College, the Chairman alluded to his having distinguished himself a few months previously at his school by gaining a prize for Greek. In giving the Silver Medal to Claude L. Bicknell, of Harrow, he stated that this was the first year in which this great public school had entered into the competition for the Society's prizes, and he congratulated Harrovians on their prompt success.

The Rev. G. BUTLER, on being called upon by the Chairman to make a few observations regarding the teaching of Geography, said he trusted that he might be permitted to respond to the Chairman's invitation, not as the Head Master of Liverpool College, but as representing the Head Masters of Public Schools generally. He gladly availed himself of this opportunity of expressing the great debt which public schoolmasters generally owed to the Royal Geographical Society for the encouragement it had given to the study of Geography, not only by giving medals, but by the annual examinations by men of world-wide reputation. Such examinations were of great value in pointing out mistakes in tuition. Two years ago he was invited by the Committee of Public Schools to bring forward the subject of teaching Geography, at a Conference held at Rugby. He then pointed out several ways in which he thought the teaching of Geography might be improved. He did not know that very great results had followed, but so far as his experience went some results had been obtained, and he thought it his duty to testify to them. First of all, the systematic study of Geography had greatly helped the intelligent appreciation of history; secondly, it had led the way to the thorough-going study of kindred branches of science; and thirdly, it had opened out to the student a comprehensive view of the greatness of the British Empire, and of the undeveloped capabilities of the accessible world. On

all these grounds, those who were engaged in the great work of Public School education felt deeply thankful to the Royal Geographical Society. Recently a memorial had been addressed by the Society to the governing bodies of the Universities of Oxford and Cambridge. If the prayer of that memorial were granted, one great good would be attained. The Public Schools of England naturally looked to the Universities as standing at the head of the education of the country, and would feel greatly indebted to the Royal Geographical Society if that Society succeeded in furthering in any way the greater harmony and solidarity of the systems of education in the Public Schools and in the Universities. There was only one other remark which he felt called upon to make, namely, that the study of Geography was no longer to be looked upon as an otiose pursuit; it required powers of mind and developed habits of thought which in different branches of literature and science could not but be of the greatest use. He was speaking within the mark when he said that of those students who had won the Royal Geographical Society's medals, or had been honourably mentioned in their examinations, many had won honours at Oxford and Cambridge in classics, mathematics, and natural science, showing clearly that whatever special aptitudes might be developed in after years, those aptitudes were in no way retarded or hindered by the study of Geography at school.

The Hon. G. C. BRODRICK said he was sure that all those who had been specially interested in these geographical prizes must have been very much gratified by the remarks just made by Mr. Butler of Liverpool College, and that everyone present would concur in the congratulations offered to that college on its long-continued success in the examinations; to Harrow (the Head Master of which happened to be a brother of Mr. Butler) on the honours which it had earned in this the first competition to which it had sent a candidate; and, as he was an old Governor of Dulwich College, he might be permitted to add to Dulwich College also, on the very distinguished place it had taken in so many competitions. He entirely agreed with what Mr. Butler had said as to the importance of the appeal which had been addressed by the Council of the Royal Geographical Society to the Universities and the University Commissioners, for everyone must recognise the advantage of encouragement given by the Universities to any study cultivated at Public Schools. Without that encouragement it was vain to expect any very large number of Public School boys to engage in any special study, for the University curriculum governed that of the Public Schools.

He had now to announce that the subject selected for next year's examination was Western Africa, between the Sahara, the territory of Egypt, the Equatorial Lakes, and the sixth parallel of south latitude, which just took in the mouth of the Congo River. It was true that this region was less fertile in purely historical interest than the African shores of the Mediterranean, for he was afraid it must be confessed that very little was definitely known about it before the Portuguese settlements a few centuries ago. At the same time no region in the world was richer in the interest which attached to geographical exploration, pursued with untiring zeal, from the Niger expeditions of Mungo Park, to the no less memorable Congo expedition of Mr. Stanley. In this work of exploration, England had throughout taken a foremost part, and in these days of scientific frontiers it would not be quite safe to predict that English travellers, missionaries, and traders, would never be followed by English troops and English governors from the unhealthy coast up to the healthier interior of the continent. At all events, Western Africa offered a very wide and instructive field for geographical study, and if its history had been comparatively barren and obscure in the past, it was likely to become far more eventful, and it was to be hoped, far happier in the future.

AMENDMENT OF THE REGULATIONS.

Admiral Sir ALEXANDER MILNE, Bart., in rising to propose an amendment that had been announced in the circular to the Fellows, said he had been very much struck with the responsible position held by the Presidents of the Society, the labours they went through, and the interest they had taken in the affairs of the Society. He need only mention Sir Henry Rawlinson and Sir Rutherford Alcock. Those gentlemen had devoted a great deal of time to the affairs of the Society, and it appeared to him somewhat unbecoming that they should be entirely lost sight of when they left the Presidential chair. He had submitted to the Council that it should be a rule to recommend for election as Vice-Presidents these and other Ex-Presidents of similar experience in future, and he now had accordingly to propose the following alteration in the rules:—That in chapter i., paragraph 3, the following words be added to the clause, after the word ‘President’:—

“Six Vice-Presidents (two of whom shall be Ex-Presidents, if available).”

The paragraph as amended would stand as follows:—“A Council shall be chosen annually from the Ordinary Fellows, to conduct the affairs of the Society; and shall consist of a President, six Vice-Presidents (two of whom shall be Ex-Presidents, if available), a Treasurer, two Secretaries, a Foreign Secretary, twenty-one Ordinary Councillors, and two Trustees.”

The Right Hon. Lord COTTESLOE seconded the motion, which was unanimously agreed to.

Sir BARROW ELLIS moved “That paragraph 6 in chapter v., section 1, be amended by substituting ‘two o’clock’ for ‘one o’clock,’ as the hour when the chair shall be taken at the Anniversary Meetings.” In doing so, he said that very few words were needed to explain why the amendment was proposed. The hour of one o’clock was fixed at a time when the Presidential Address on the progress of Geography was a very lengthy document, but it had now been resolved to very much curtail it, and to men of business an hour in the middle of the day was extremely valuable, while to those who had no business avocations it was equally valuable for the purposes of luncheon. The Council had therefore considered that in the interest of the members generally the hour should be altered to two.

The Rev. C. HEAVEN seconded the motion, which was agreed to.

The ballot for members of the Council then took place.

Mr. C. R. MARKHAM read the Annual Address, which he had prepared, on the Progress of Geography.

At the conclusion of the Address, the CHAIRMAN announced that the President, Vice-Presidents, and members of Council recommended to the Fellows, according to the printed list, had been duly elected. The Council for 1879-80 would therefore stand as follows (the names printed in *italics* being new members, or those who change office):—

President: Right Hon. the Earl of Northbrook, G.C.S.I. *Vice-Presidents*: Sir Rutherford Alcock, K.C.B. (Ex-Pres.); Major-General Sir H. C. Rawlinson, K.C.B. (Ex-Pres.); *Sir Henry Barkly*, G.C.M.G., K.C.B.; *Captain F. J. O. Evans*, R.N., C.B., F.R.S.; *Francis Galton*, Esq., F.R.S.; Admiral Sir Alexander Milne, Bart., G.C.B. *Treasurer*: Reginald T. Cocks, Esq. *Trustees*: Lord Houghton, D.C.L., F.R.S.; *Sir John Lubbock*, Bart., M.P., F.R.S. *Secretaries*: Clements R. Markham, Esq., C.B. F.R.S.; R. H. Major, Esq., F.S.A. *Foreign Secretary*: Lord Arthur Russell, M.P. *Members of Council*: Hon. G. C. Brodrick; Right Hon. Lord Cottesloe; Robert Needham Cust, Esq.; Sir Barrow H. Ellis, K.C.S.I.; *James Fergusson*, Esq., F.R.S.; Sir T. Douglas Forsyth, K.C.S.I., C.B.; Douglas W. Freshfield, Esq.; *Colonel H. H. Godwin-Austen*; Colonel J. A. Grant, C.B., C.S.I., F.R.S.; Major-General Sir W. H.

R. Green, K.C.S.I., C.B.; Lieutenant-General Sir J. H. Lefroy, R.A., K.C.M.G., F.R.S.; Sir William L. Merewether, K.C.S.I., C.B.; Admiral Sir Erasmus Ommanney, C.B.; Colonel Sir Lewis Pelly, K.C.B., K.C.S.I.; Lieutenant-General Sir Arthur Phayre, C.B., K.C.S.I.; Sir R. W. Rawson, K.C.M.G., C.B.; Major-General C. P. Rigby; S. W. Silver, Esq.; General R. Strachey, R.E., C.S.I., F.R.S.; Major-General Sir H. L. Thuillier, C.S.I., F.R.S.; Sir Harry C. Verney, Bart.

Sir RAWSON RAWSON proposed a vote of thanks to the retiring members of Council, the committees, auditors, secretaries, and scrutineers. He anticipated that the report which had been read would dispose the Society to look favourably on the work of the Council and officers during the past year. The change in the issue of the 'Proceedings' would mark 1879 as an epoch in the Society's history. He regarded it as binding the Council and members closer together than hitherto. It gave members an opportunity of forwarding to the Secretaries, for insertion in the 'Proceedings' at monthly intervals, any information which they received from their friends and correspondents abroad, but which might not be of sufficient importance to take the shape of a formal paper to be read at a meeting. It was hoped that in a short time the 'Proceedings' would be the channel of communications of the most interesting geographical character both to the members and to the public in general.

Sir W. L. MEREWETHER seconded the vote of thanks, which was unanimously agreed to.

The proceedings then terminated.

THE ANNIVERSARY DINNER.

The customary annual dinner of Fellows and their friends took place in the evening of the same day, at Willis's Rooms, St. James'; Sir RUTHERFORD ALCOCK, K.C.B., acting Vice-President, in the chair. About 140 Fellows and their friends attended. Among the distinguished guests and members present were:—H.E. Count Schouvaloff, Russian Ambassador; His Grace the Archbishop of York; the Dean of Westminster; the Right Hon. the Earl of Northbrook, President Elect; Lord Houghton; the Right Hon. Lord Cottesloe; Lord Colchester; Lord Tenterden; Lord Reidhaven; Baron Overbeck; Major-General Sir Henry Rawlinson, K.C.B.; General Sir Lintorn Simmons, R.E., G.C.B.; Admiral Sir Alexander Milne, Bart.; Lieutenant-General Sir Arnold Kemball, K.C.B.; General C. P. Rigby; General Copland-Crawford; Major-General Sir Henry Thuillier, F.R.S.; General McAndrew; Rear-Admiral D. Miller; Sir Wm. Merewether; Colonel Sir Lewis Pelly, K.C.B.; Sir Henry Barkly, K.C.B.; Sir Brooke Robertson; Sir Rawson W. Rawson; Sir G. Fowell Buxton, Bart.; Sir Julian Panncefote; Sir R. R. W. Lingen, K.C.B.; Colonel J. A. Grant; Colonel W. Pinney; Colonel H. H. Godwin-Austen; Captain F. J. Evans, R.N. (Hydrographer to the Admiralty); A. J. Beresford Hope, Esq., M.P.; Dr. W. B. Carpenter; Eugene Schuyler, Esq.; Hon. G. C. Brodrick; W. H. Wyld, Esq.; R. G. W. Herbert, Esq., &c., &c.

After the usual loyal toasts, "Her Majesty the Queen, Patron of the Society;" "H.R.H. the Prince of Wales, Vice-Patron;" "H.R.H. the Duke of Edinburgh our Honorary President, and the rest of the Royal Family," had been proposed by the Chairman and heartily responded to by the assembly, Major-General Sir H. RAWLINSON said it was his privilege to be permitted to give a toast which might be called the toast of the evening—"The Health of the Medallists of the Year." Among other reasons, he valued this privilege because, as he had sometimes unfortunately had occasion to take an unfavourable view of the proceedings of our Russian friends in matters of politics, he was very glad to have an opportunity to express himself in an entirely contrary sense now that they were met on the common ground of dis-

covery and science. He trusted that he might congratulate the Russian Ambassador on the glory which his nation had derived from Colonel Prejevalsky's triumphs in the acquisition of scientific and geographical knowledge. In conclusion, he begged to propose the health of "The Medallists of the Year," Colonel Prejevalsky and Captain Gill, an officer who had brought to his geographical work very high professional attainments. Captain Gill had entered the Royal Engineers at an early age, and having come into possession of very ample means had preferred to devote those means to the useful and healthy pursuit of geographical inquiry rather than to the dissipations of life in London and Paris. He would now give the toast of "The Medallists of the Year," associated with the names of the Russian Ambassador and of Sir Lintorn Simmons.

Count SCHOUVALOFF, who was received with much cheering, said he felt truly grateful for the kind words Sir Henry Rawlinson had addressed personally to him, and he hoped to be allowed to answer this toast on the part of his absent countryman whom the Royal Geographical Society had distinguished that day, and whom he might on that occasion call one of the two *beati possidentes*. He was happy to hear the name of Colonel Prejevalsky associated with that of Captain Gill, and in this association he saw a happy augury of mutual friendship between the two countries. In conclusion, his Excellency expressed a hope that if ever there should be a contest between these two nations, this contest would only be on the ground of science, and on this ground of competition he felt certain that each would always gladly welcome the other's victories.

General Sir J. Lintorn Simmons, R.E., chief of the branch of the service to which Captain W. Gill, R.E., the other medallist of the day, belonged, responded on behalf of that officer, who is at present absent on public duty in Asia Minor.

The other toasts were "The University of London," by the Chairman, responded to by Dr. W. B. Carpenter; "The Earl of Northbrook," also by the Chairman, acknowledged by his Lordship; "The Chairman," proposed by Lord Houghton and responded to by Sir Rutherford Alcock; and last, "The Trustees, Treasurer, Secretaries and Staff," proposed by Sir H. Barkly and briefly acknowledged by Mr. Markham, the senior Secretary.

REPORT OF THE EVENING MEETINGS, SESSION 1878-79.

Thirteenth Meeting, 9th June, 1879.—The Right Hon. the Earl of NORTHBROOK, G.C.S.I., President, in the Chair.

PRESENTATION.—*Edward Almack, Esq.*

ELECTIONS.—*Geo. L. Ansted, Esq.; Fredk. Chas. D. Haggard, Esq.; Theodore Harris, Esq.; Lionel Hart, Esq.; Robert Kell, Esq.; Jno. Wm. Laing, Esq., M.A.; Edwd. Wm. Lewis, Esq.; Captain William McClintock, R.A.; Vincent Edwin Older, Esq.; Jno. Paddon, Esq.; Eugene Rimmel, Esq.; Charles Williams, Esq.*

The third and concluding science lecture of the Session was delivered this evening by Mr. John Ball, F.R.S. On taking the Chair,

The PRESIDENT said he had great pleasure in introducing Mr. Ball on this the first occasion on which he had the honour of presiding over a meeting of the Royal Geographical Society, as he was one of his earliest colleagues in Government when he first entered public life. Without divulging any secrets, he might state that at their meeting that day the Council had been considering how it would be possible to give to those gentlemen who were actively engaged in exploration in different parts of the world, some amount of scientific education, to enable them to make

observations to some good purpose wherever their energy took them. Mr. Ball was a model of what an explorer should be. He had been distinguished for his ascent of many of the high peaks of the Alps, and for having written the best books upon Alpine travel that had ever been published. In all the excursions that he had made, he had directed his attention to the natural products, and also to the great changes of the earth which had brought about the present distribution of those products, and had thus manifested the very qualities which were desired in all those who travelled in different parts of the world. Although from having been only so recently connected with the Society he could but imperfectly express the objects of the Council, he believed their desire was to occasionally go a little beyond the ordinary scope of geographical discovery, and to-night their attention would be directed to the great geological changes of the earth's surface as affecting the Alpine flora, a subject so intimately connected in its different aspects with geography, that he was sure it would command the best attention of the Meeting.

"On the Origin of the Alpine Flora." By John Ball, F.R.S. The lecture, with remarks of speakers, will be published in a future number.

PROCEEDINGS OF FOREIGN SOCIETIES.

The Inter-oceanic Canal Congress at Paris.—As is now well known, the Congress, at the end of its long discussion, decided on the line "Limon-Panamá" as that of the future canal to unite the two oceans; this line alone satisfying the conditions which the majority considered indispensable, i. e. it required neither locks nor tunnels.

Two out of the five Sections gave in their report, as recorded in our June number, by the 23rd of May; but these had no great influence on the general conclusion. The fifth Section, which had for its reporter M. Cérésolé (former President of the Swiss Confederation), and the first Section, represented by M. Levasseur, gave in their reports at the general meeting of the 28th of May. The fifth Section had been interrupted in its deliberations by the necessity of ascertaining the amount of annual tonnage on which the canal might reckon at its opening; for this factor it had to await the result of the inquiries of the first Section. But, impatient of the delay, it resolved on ascertaining the amount by a calculation of its own, founded on the existing traffic between the east and west coasts of America; it thus arrived at a total of 6,000,000 tons per annum, as the approximate amount, certainly coming within the reality. At a charge of 15 francs per ton, this would give an annual revenue of 90,000,000 of francs, which would yield an annual dividend of 6 per cent. on a capital of 1500 millions, which it was supposed the finished canal would represent. The rate of 15 francs per ton was, however, considered by the majority too high. At this stage of the question, the report of the first Section, founded on more exact and rigorously-tested statistics, was completed. According to this report, the tonnage using the canal in the year 1889 would be 7,250,000 tons per annum, which at a charge of 10 francs per ton would ensure, from the opening, an annual revenue of 72,500,000 francs. These calculations had, at this juncture, great importance, for it was known that the fourth Commission (the Engineers) had made their calculations of cost on a most liberal scale. The total of 28,000,000 sterling had been exceeded in their estimates for a canal with locks, and 40,000,000 according to them was the minimum for a canal on the level. The certainty that the annual tonnage would remunerate either one or the other of the projects was reassuring to many members, who would have had, much to their regret, to renounce their favourite canal on the level, if it had been shown to be unremunerative. They were

now free to choose between the more costly level canal, and the cheaper canal with locks.—All the members of the Congress crowded on the following day to the fourth Section, which had that day to make its choice among the various schemes. The objection that the isthmus was subject to earthquakes, forcibly put by some members, had to be disposed of. But, on the other hand, the able paper by M. Fontane, showing that not more than twelve ships per diem could pass a canal with locks, whilst at certain periods of the year 200 vessels would be requiring a passage, had great weight in favour of the level canal. Sub-sections of the fourth had prepared accurate detailed plans of all the schemes, and on these the Section proceeded to vote. It rejected successively the following routes: 1, Tehnantepec, which required 120 locks; 2, Nicaragua (Méuocal and Blanchet project); 3, Panamá, the line requiring locks (Méuocal and Wyse project); 4, San Blas, level canal (Wyse project) on account of its tunnel; 5, Atrato-Napipi (Selfridge line), for its costliness and the difficulty of canalising the mouths of the Atrato; finally, it adopted, as above stated, the Limón-Panamá line, according to the plans of MM. Wyse and Reclus. The report of the fourth Section was read in general meeting on the following day, May 29th; and the Congress was invited to vote upon it. The result was that, out of 98 members, 74 voted for, 8 against, and 16 abstained from voting. Among those who voted in favour was M. de Lesseps, who announced at the same time that he was ready to place himself at the head of the enterprise; on the same side was Colonel Sir John Stokes, the English delegate. Admiral de la Roncière le Noury immediately afterwards took the presidential chair, and in a brief speech declared the Congress closed.

A few words may be added in concluding this report. MM. Wyse and Reclus, whose skill, enterprise, and perseverance in exploring the isthmus, have been generally acknowledged, are congratulated on the splendid success they have achieved. Coming after the grand explorations of the Americans under Commander Selfridge, they have, by successive journeys and minute topographical surveys in various directions, filled up the gaps left by their predecessors. The expenses of their explorations were defrayed by a private society, organised by General Turr. It was pretty well understood at the Congress that the engineering work of the canal, soon to be undertaken, would be placed under their direction.—With regard to the detailed work of the Congress, the reports of the first and fourth Sections contain a mass of information of great value to the geographer and statist. The first brings together a wonderful amount of exact data, compiled from the newest and best sources, regarding the commerce of countries on both the Atlantic and Pacific shores of America. The fourth expounds with wonderful lucidity the difficulties in constructing such a canal, and brings to the subject all the science and engineering experience of our day. The reports will soon be published, together with the General Report of the Congress, under the care and at the expense of the Geographical Society of Paris.

Geographical Society of Paris.—May 16th: M. DAUBRÉE in the Chair.—A communication was read on the subject of the reversion of the Oxus to the Caspian Sea, from M. Woëlkof, of St. Petersburg. In it he showed that there had never been, as was generally believed, an elevatory movement of the earth's surface between the Oxus and the Caspian. The Oxus had deviated towards the Aral, for the same reason as the Cauvery in India had changed its course, as he had described in the 'Geographical Magazine' in 1877, viz. in consequence of irrigation canals. The latest levelling observations had demonstrated that there was no trace of a rise in the land. The most interesting point in M. Woëlkof's paper was the examination of the changes which would be produced in the physical geography of Central Asia by the return of the Oxus into the Caspian, and the creation thereby of a navigable route which would connect European Russia with Central Asia. The Aral would become nearly

dry, for the Jaxartes only furnishes about sufficient water to balance the evaporation. When the countries situated in the Caspian and Aral basins shall have become civilised, and have utilised for agricultural purposes the waters of all the rivers which feed the interior seas, the Aral will exist no longer, and the Caspian will be reduced to two lakes of nearly elliptical form, one to the east of Derbent, the other between Baku and the southern coast. The Volga will be joined to the Oxus by a straight canal passing by the eastern side of the Caspian, and its vessels will reach without transhipment the northern part of Afghanistan. These two lakes will then serve only as receptacles of the surplus water in seasons of floods.—In the discussion which followed, M. Vivien de Saint Martin said that in the time of Alexander the Great the Oxus had two branches, of which the main one directed itself towards the Aral, and the smaller one to the Caspian. It was the main branch that was measured by the Expedition, for the measurements given do not apply to the Caspian branch, whilst they are exact when applied to that discharging into the Aral. M. D'Abbadie, speaking of the determination of altitudes by the species of plants growing at various heights (alluded to by M. Voëikof), said that during his travels in Abyssinia, after having made known to certain botanists the fact that vegetation was distributed on the mountains with great regularity, he was invited by the same botanists to verify the height of a mountain that he had indicated from native information as lower than a neighbouring mountain. The trees which had been indicated as growing on the summits of the two mountains showed that the lower one ought to have been the higher. The two mountains were surveyed hypsometrically, and the result showed that the botanists were right and the natives were wrong.

June 3rd, 1879: M. DAUBRÉE in the Chair.—M. D'Abbadie (the well-known traveller in Abyssinia) informed the Society that he had just received a letter from Monsignor Massaja, Missionary Bishop of Abyssinia, in which he communicated the most recent intelligence relating to the Italian Shoa Expedition. According to him, Signors Cecchi and Chiarini, having advanced beyond the country of Djumma, had been made prisoners by a native chief, and subjected to forced labour of the most painful description. King Menilek had undertaken to do all in his power to extricate them from their distressing position.—A letter from Gerhard Rohlfs was read, dated from Djâlo, south-east of Zella, 11th April, 1879. Up to that point the traveller had followed a route intermediate between those of Horneman and Beurmann, and consequently quite new: the country passed through was desert and forbidding, but an oasis was met with called Abu-Nain, which is not found on any map; it is of considerable extent, but the water is not good. A violent sirocco blowing at the time prevented Rohlfs from taking astronomical observations to fix its position; he was, however, able to place it on his map with tolerable exactitude. After this he passed through the Oasis of Djebbena, rich in date-trees, and the *serir* (naked desert) of Kalatcho, which separates the just-named oases from that of Kufra. This region is remarkable for its fossiliferous beds, rich especially in molluscs; it offers a fine field of exploration to the paleontologist, no part of the Sahara or the Lybian desert being comparable to it in this respect. At Djâlo, Rohlfs found himself badly received; on his entry he was pelted with stones by the young people. No inhabitant was willing to serve him as guide, and he did not feel justified in risking the lives of the members of his caravan in pushing on further without knowing the position of the wells. He would be obliged therefore to await the departure of some native caravan. Unfortunately the hot season was commencing, and the delay at Djâlo would probably be much longer than had been calculated upon. The unfortunate delay at Sokna, waiting for the presents sent by the Emperor of Germany to the Sultan of Wadai, was the cause of this untoward state

of things.—A letter was also read from MM. Cambier and Dutrieux, the commanders of the Belgian International Expedition, which was staying at Tabora in Unyanyembe during the rainy season. The letter was dated March 16th, 1870.—A paper was read on the topographical and hydrographical conditions which led to the great Szegedin inundation, by General Türr.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

EUROPE.

Baedeker, K.—The Eastern Alps, including the Bavarian Highlands, the Tyrol, Salzkammergut, Styria, and Carinthia. Handbook for Travellers. 4th edn. Leipsic (London, Dulau): 1879, 16mo., pp. 406, maps, plans, &c.

This practically represents the 'Southern Germany,' 1873, of the same series, with the exception of Austria, now published separately.

— Switzerland, and the adjacent portions of Italy, Savoy, and the Tyrol. Handbook for Travellers. 8th edn. Leipsic (London, Dulau): 1879, 16mo., pp. 470, maps, plans, &c.

Lock, C. G. W.—The Home of the Eddas; with a Chapter on the Sprengisandr by Dr. C. Le Neve Foster. London (Sampson Low & Co.): 1879, 8vo., pp. 348, map.

The chief interest of this work is in its accurate delineation of Icelandic winter life, but it will always be valuable from the amount of etymological material contained in it. Information of all kinds likely to assist travellers, and including many details of routes, will be found in an appendix. The map is (by permission) taken from that published by the Society in illustration of Mr. Watts's paper on the Vatnajökull, and shows the author's travels on three different routes across the island, from the south-west to north-east, &c.

ASIA.

Brucker, J.—Benoit de Goës: Missionnaire Voyageur dans l'Asie Centrale, 1603–1607. Lyon (Pitrat): 1879, 8vo., pp. 42.

This extract from the 'Études Religieuses' chiefly shows the confirmation by modern travellers of the observations by Goës relating to Kashgar, Yarkand, Cabul, &c.

Burton, R. F.—The Land of Midian (revisited). London (Kegan Paul & Co.): 1879, 2 vols. 8vo., pp. 338 and 319, map, pls.

Contains the full details and worked-out results of the expedition whereof an introductory account was noticed in the current vol. of our 'Proceedings,' p. 76. The object was primarily mineralogical, and the collections made indicate in the author's opinion sources of wealth not likely to remain unworked. In geography, the principal novelties are the identification of ruined cities mentioned by Ptolemy, and the plutonic centres scattered over the seaboard and interior. The great volcanic chain El-Harrah is believed to commence with the Damascan Trachonitis, and to subtrend the whole coast of N.W. Arabia between El-Muwaylah and El-Yambú'. The Wady Hamz, the southern frontier of Egyptian Midian and the northern limit of the Ottoman Hejaz, is considered as a main approach to the Arabian interior, being not a mere fissure, but an opening where the maritime chain breaks to the north and south. Its mouth is fixed at 25° 55' N. lat. These volumes abound with reproductions of discussions upon inscriptions and other objects of archaeological and historical interest. The map (by W. J. Turner) is constructed from reconnaissances and surveys made by officers of the Egyptian General Staff under the author's command (scale, 16 English miles to the inch).

Conder, C. R.—*Tent Work in Palestine. A Record of Discovery and Adventure.* London (Bentley): 1879, 2 vols., 8vo., pp. 381 and 352, pls.

Published for the Committee of the Palestine Exploration Fund, in whose 'Quarterly Statement' the chief points here recorded have been from time to time noticed. These volumes contain Lieutenant Conder's personal history of his work on the Survey (some 4700 square miles), without specially entering on the scientific results, which will accompany the great map, in the form of memoirs, one to each sheet.

Walker, Major-General J. T., and Vanrenen, Major-General D. C.—*General Report on the Operations of the Survey of India, comprising the great Trigonometrical, the Topographical, and the Revenue Surveys under the Government of India, during 1877-78, prepared for submission to the Government of India.* Calcutta (Office of Superintendent of Government printing): 1879, pp. 163 and xix., maps, &c.

Comprises the work of the survey year commencing 1st Oct., 1877, and is the first issue of the Department designated 'The Survey of India,' formed by the amalgamation on 1st January, 1878, of the Great Trigonometrical, Topographical, and Revenue branches. A general explanation is given of the necessary remodelling of the staff and its duties, followed by a summary of the operations (1) of the Trigonometrical and Topographical parties, and the Surveyor-General's offices, and (2) of the Revenue Survey parties, and Deputy Surveyor-General and Boundary Commissioner's offices. The appendix contains Reports on operations by Mr. E. C. Ryall in Hundes, part of Chinese Tibet, in 1877, and on the survey of the western sources of the Ganges, particularly the Jadh Ganga or Nilang Valley, in 1878, by Mr. T. Kinney. Of the maps exhibiting the progress made by the various parties engaged, that illustrating the Adam Khel country, north-west frontier, surveyed during the Jowaki expedition, is the most interesting.

AFRICA.

Gussfeldt, P., Falkenstein, J., and Pechuël-Loesche, E.—*Die Loango-Expedition, ausgesandt von der Deutschen Gesellschaft zur Erforschung Aquatorial-Africas, 1873-1876.* Leipzig (Frohberg): 1879, large 8vo. Zweite Abtheilung, pp. 183, pls. (*Asker.*)

This second part, entirely by Dr. Falkenstein, is confined to the anthropological, faunistic, botanical, and medical aspects of the expedition—a supplement being devoted to the diseases of the Loango coast. The illustrations continue to be of special excellence.

AMERICA.

Fleming, Sandford.—*Report in reference to the Canadian Pacific Railway.* Ottawa (Macleay, Roger, and Co.): 1879, large 8vo., pp. 142, map.

Supplementary to the report of progress at end of 1878, noticed in the current volume of our 'Proceedings,' p. 78, and containing, in addition to many observations and suggestions of political and economic importance in connection with the scheme of telegraphic and railway construction, a practically useful section, descriptive of the physical character of the country within the limits of the prairie region, so far as known. This is subdivided into blocks, bounded by separate parallels of latitude and longitude; and all available information from scientific travellers or other reliable authority referring to these is systematically arranged in an appendix, and illustrated by a special map. Much remains to be discovered respecting large areas; and the present report will probably clear up misconception with respect to parts of the territory, of which large tracts have been declared worthless on very slender data, and equally extensive areas pronounced of the greatest fertility on insufficient grounds. The map (scale 53 miles to the inch) covers the whole prairie region, and shows the routes of travellers who have made any record, with indications by colour of the nature of the soil.

Fletcher, J. C., and Kidder, D. P.—Brazil and the Brazilians, portrayed in historical and descriptive sketches. 9th edn. London (Sampson Low and Co.): 1879, 8vo., pp. 646, maps, pls.

This edition of a standard work brings up the historical portion to date, and is also increased by various corrections and notes, an index, and some new portraits.

Lista, Ramon.—Viaje al pais de los Tehuelches, Exploraciones en la Patagonia Austral. Primera parte. Buenos Aires (Libreria Europea): 1879, 8vo., pp. 82, map, cuts.

The author's route from Santa Cruz to Punta Arenas is practically the same as Beerbohm's noticed in the current vol. of our 'Proceedings,' p. 284. But he also travelled north-west from Santa Cruz to Korpen-aiken at the junction of the rivers Shehuen and Chico, ascending the former to Paradero and following the latter to its source on the slopes of the Cordillera, near a lake, 4 miles long and 2 broad, above Lake Viedma, south-west of the junction of a little river named by him Belgrano. In the course of this exploration, he visited Chunke-aiken, on the north bank, with its volcano Chaltel, and Mount Mawaish, on the south bank, which he figures (as Musters's representation is stated to be incorrect). At the extreme point reached, further progress was hindered by the dense vegetation, some of the trees being gigantic, with immense trunks. The author gives many incidental notes on the geology, natural history, and botany of the region traversed, as might be expected from his having been sent by the Argentine Scientific Society. On the map, the Argentine Republic is boldly made to extend to Punta Arenas.

AUSTRALIA.

Jung, C. E.—Australien und Neuseeland, historische, geographische und statistische Skizze. Leipzig (Mutzke): 1879, 8vo., pp. 90, plates. (*Asher*.)

Shillinglaw, J. J.—Historical Records of Port Phillip: the first Annals of the Colony of Victoria. Melbourne (Ferres): 1879, 8vo., pp. 141, map, cuts.

These official papers set at rest some points which have hitherto been disputed regarding the settlement attempted by Governor Collins at Port Phillip Heads some seventy-five years ago. The most interesting part of their contents is the journal of the expedition by Flemming and fac-simile of the chart by Grimes, resulting from the original survey of Port Phillip in 1803.

ARCTIC.

Markham, Capt. A. H.—Northward Ho! London (Macmillan): 1879, sm. 8vo., pp. 347, map, illustrations.

A general account of voyages of which the discovery of the North Pole has been the object, commencing with the earliest traditions. The chief feature of the book is the reproduction of a journal kept by Mr. Floyd, a midshipman, during Captain Phipps's voyage in 1773, which was suggested by Daines Barrington, and in which Nelson took part.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Artaria & Co.—Neueste touristen-Karten. Blatt X. Dolomiten von Süd-Tirol, Bruneck, Bozen, Ampezzo, etc. Scale 1:129,600 or 1·7 geographical mile to an inch. Gezeichnet und gravirt von R. Maschek, sen. Artaria & Co. Vienna, 1879. (*Dulan*.)

Austrian Government.—Specialkarte der Oesterreichisch-Ungarischen Monarchie im Masstabe 1:75,000 der Natur, or 1 geographical mile to an inch. 1879. (*Dulau.*)

The following sheets have just been published: Zone 2, Column XXVI.—Zone 4, Columns XV. & XVI.—Zone 5, Column XVI.—Zone 6, Columns XV., XVIII., and XX.—Zone 7, Columns XVI., XX., & XXI.—Zone 8, Column XXV.—Zone 9, Column XV.—Zone 10, Columns XXI., XXII., & XXV.—Zone 12, Columns XXI., XXV., & XXVIII.—Zone 13, Column XXIX.—Zone 24, Column XXXIX.

Bartholomew, J., F.R.G.S.—Caithness District of the Reduced Ordnance Maps of Scotland, by John Bartholomew, F.R.G.S. Scale 1:125,000 or 1·7 geographical mile to an inch. A. & C. Black. Edinburgh, 1879.

This Map is a reduction of the one-inch Ordnance Survey, so as to make it more portable and useful for tourists and others.

Dépôt de la Guerre.—Carte de la frontière des Alpes. Scale 1:80,000 or 1 geographical mile to an inch. Dépôt de la Guerre. Paris, 1879. (*Stanford.*)

The following sheets are now published: Mt. Viso, St. Étienne, Demonte, St. Sauveur, St. Martin-Lantosque, Tende, Puget-Théniers, Sospel, Taggia, Grasse, Cannes, Antibes, Fréjus, and Vintimiglia.

Depósito de la Guerra.—Mapa Mural de España y Portugal. Scale 1:500,000 or 6·8 geographical miles to an inch. Depósito de la Guerra. (*Dulau.*)

This map is a coloured lithograph on 10 sheets, and is by far the best wall map of Spain and Portugal, yet published. All Roads, Railways, Telegraphs, Capitals, Governments, Military Depôts, Naval Stations, Ports, and Ports, are clearly laid down, and brought up to date. The whole style in which the map is executed is bold and clear.

Lebour, G. A., F.G.S., F.R.G.S.—Geological map of the County of Northumberland, including the Town and County of Newcastle-upon-Tyne, and the Town and bounds of Berwick-upon-Tweed. By G. A. Lebour, F.G.S., F.R.G.S. Scale 1:195,000, or 2·6 geographical miles to an inch. Published by Andrew Reid, Newcastle-upon-Tyne, 1879.

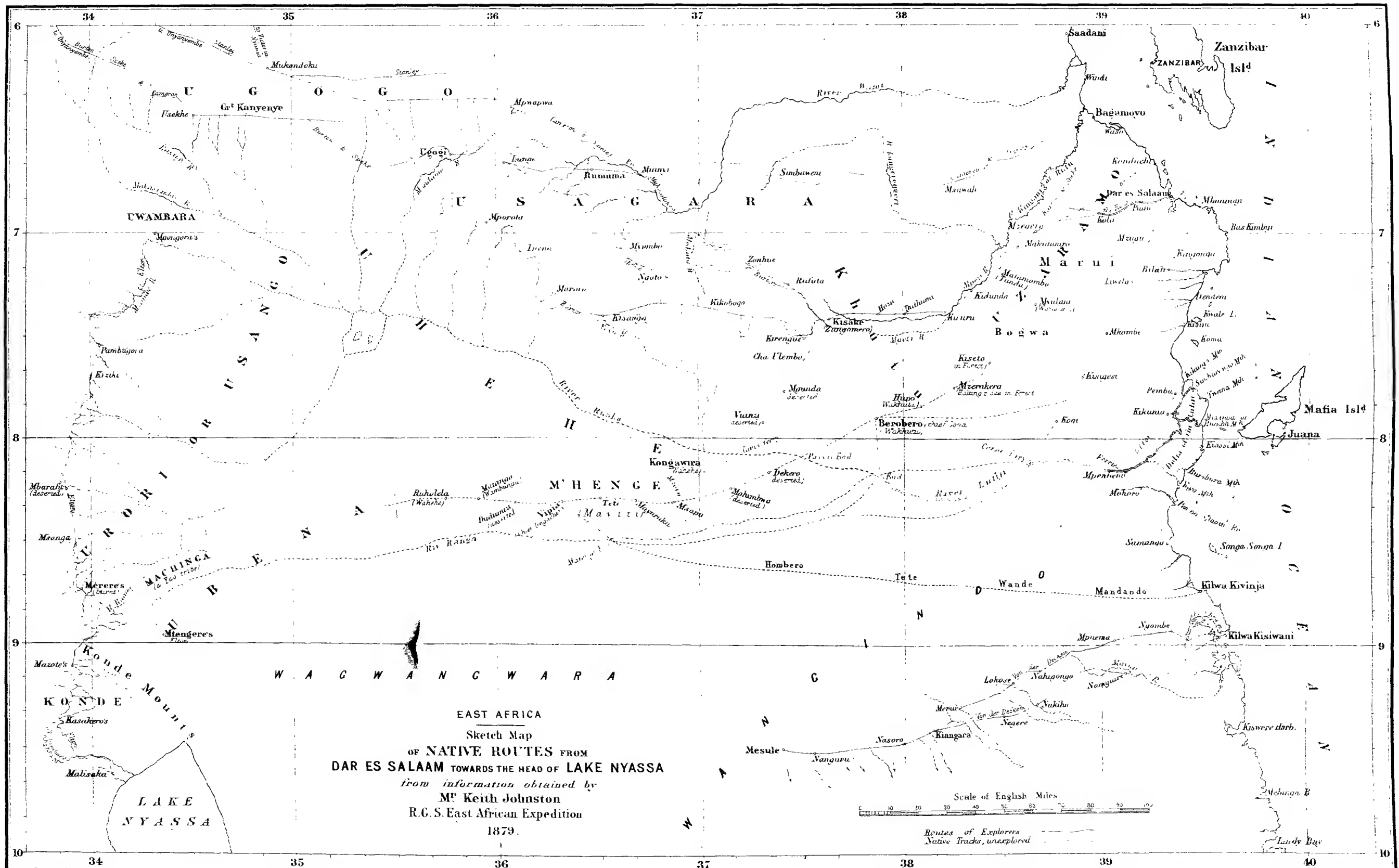
AUSTRALIA.

Du Faur, E.—Tourist's Map, showing the Great Western Railway of New South Wales crossing the Blue Mountains, from the Nepean River to Bowenfels, also the localities and natural features of greatest general interest in the vicinity of the line and the principal measured lands. Scale 1:73,000 or 1 geographical mile to an inch. Compiled by E. Du Faur. S. T. Leigh & Co., Sydney, 1879.

This map is intended as a guide to places of interest in the Blue Mountains, New South Wales, accessible from the line of railway; and also as a key to the portfolios of Blue Mountain photographs published by Mr. Du Faur, two years ago.

Stieler, Adolf.—Hand-Atlas über alle Theile der Erde. Neu bearbeitet von Dr. August Petermann, Dr. Hermann Berghaus und Carl Vogel. 4 Lieferung. Justus Perthes, Gotha, 1879. (*Stanford.*)

The contents of the fourth part of the new edition of Stieler's Hand-Atlas are as follows:—No. 8. Höhen und Tiefen der Erde in Lambert's Zenithal-Projection. Von Herm. Berghaus. Nebenkarten: Planiglob der Antipoden. Pacificische Erdhälfte. Atlantische Erdhälfte. No. 15. Europa, von A. Petermann, 1:15,000,000. Nebenkarten: Der Mont-Blanc und Umgebung, 1:500,000. Der Kasbek und Umgebung, 1:500,000. No. 83. Vereinigte Staaten von Amerika in 6 Bl. Blatt. 1. Von A. Petermann, 1:3,700,000.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Major Serpa Pinto's Journey across Africa.

Map, p. 544.

MAJOR SERPA PINTO, the eminent Portuguese traveller, in carrying out his plan of visiting London, Paris, and Brussels, immediately after his first appearance in Lisbon, in order to lay before the geographers of those capitals an account of the remarkable journey he has performed, arrived in London on the 7th of July. The Session of the Society being then terminated, he was invited to submit a brief report of his explorations to the President and Council, as preliminary to the meeting of the Geographical Section of the British Association, which takes place at Sheffield on the 20th of August, and at which an opportunity was offered him of reading a more complete paper. The following account, in the form of a letter to the President, was consequently drawn up by him. He was also received by Lord Northbrook, at his house on the 16th of July, and made a short address of similar character to this Report, to the company there assembled, which included most of the Council and many members of the Society interested in African exploration.

The field-books, original charts, and journals of Major Pinto have been freely submitted by him to the Society's officers, and have been used in compiling the original map which accompanies the present Report.

TO the RIGHT HON. THE EARL OF NORTHBROOK, &c., &c., &c.

LANGHAM HOTEL, 16th July, 1879.

MY LORD,—At the termination of my journey across the continent of Africa, I arrived in British territory. Entering as a travel-worn stranger from the savage regions to the west, and exhausted by illness, I found there a hearty welcome. The great kindness with which I was received

led me there and then to resolve, as a matter of duty, to make England, after my own country, the first to be visited on my return to Europe, and to receive a report of my journey and the results of the investigations made in the course of it.

It was late in the season when I reached Europe, and it is only now that I have been able to come to England; unfortunately not in time to avail myself of the ordinary meetings of the Session of the Royal Geographical Society.

Nevertheless the offices of the Society continue open, and free opportunities have been granted me to submit the results of my journey to the Society's staff.

The next step open to me is to lay before your Lordship as President of the Society, a brief account of my explorations, instead of the longer narrative which it would have been my pleasure under other circumstances to offer to the Society.

On my recent journey, undertaken for the sole purpose of geographical investigation, I passed from the Atlantic to the Indian Ocean. Part of the region which I traversed was previously quite unknown: regarding other wide tracts there existed in Europe, and especially in England, some knowledge from previous explorers and some notions more or less vague.

Starting from Benguela, on the Atlantic coast, I proceeded first to Bihé, a native settlement in the interior, crossing different territories subject to the King of Portugal, and rectifying as I went the positions of rivers, mountains, and villages, of which the chief, subject to Portuguese authority, are Quillengues and Caconda. In the month of May, 1878, I left Bihé, my principal object being to investigate the hydrographical system of the country to the E.S.E. of that place, as far as the Zambesi. This country forming the southern limit of the Benguelan highlands, stands 5000 feet above the level of the sea, and possesses great advantages in its salubrity and its commercial and agricultural capabilities, which highly recommend it to European attention.

In all tropical Africa this is the territory most suitable for European colonisation.

In obedience to the instructions of my Government, by whom I was sent to Africa, I left Bihé, passed through the said region, accompanied by good native guides, and succeeded in solving the problem entrusted to me, by making a complete study of the hydrographical system concerning those vast regions. Owing to circumstances alien to the wishes of the Government of His Majesty the King, I performed my journey with scarcely any resources. I and my party had to live solely on the product of the chase from day to day, and thus, with occasional help from friendly natives, I succeeded in accomplishing my difficult task. A journey under such circumstances, in such a country, must naturally have been attended with curious adventures, with sometimes

comical, sometimes terrible episodes. It would not be proper, however, to occupy your Lordship's time with an account of these. A detailed account, taken from my diary, will, I hope, be published shortly, in the form of a Book of Travels, and this will give to all who desire to know, the narrative of my journey, and also the chief results of my scientific investigations. My purpose is now to lay before your Lordship and the Society a brief summary only.

I will begin by stating what were the means employed by me to determine my positions; accurate geographical survey having been throughout my first object.

The instruments I carried with me consisted of two sextants, one made by Casella of London, and another obtained from Paris; to work with them I made use of the artificial horizon of mercury, never having been able to obtain any correct results by other methods. A pretty fair telescope by Casella enabled me to examine a certain number of celestial phenomena. I also had several compasses of different kinds, which were not only used in directing my route, but were also serviceable in observations I made to determine the magnetic variation, a mysterious phenomenon to which science has hitherto been unable to apply any law. For the purpose of determining the heights above the sea-level, I made use of three hypsometers, two of them from the ateliers of Bardin of Paris, and the other made in Berlin. A small aneroid, by Secretan, always checked by the hypsometers, was used by me for the purpose of prompt determinations, and as a barometer for my meteorological observations.

By the help of thermometers and other instruments, I was able in the course of my journey to make a long series of meteorological observations; these, however, are not quite continuous for the whole period, on account of interruptions by serious illness.

My latitudes were determined by meridian altitudes of the sun, as well as of the moon; very seldom by the stars, which are difficult as a rule to be observed in an artificial horizon when it is small. My longitudes were mainly determined by eclipses of the satellites of Jupiter, viz. the first and second satellite, the formula given by Baron de Demoiseau not being strictly correct as to the eclipses of the other two satellites. As a rule, the time taken near the moment of the eclipse would give me the real hour on the spot. To reckon this hour I invariably used the formula of Napier, which gave me as a result half the sine of the hour angle.

I have brought home a great number of chronometrical longitudes, which cannot contain important errors, as my chronometers were continually regulated and compared with the result of the eclipses of the first satellite of Jupiter. In the month of May of 1878 I had the chance of observing the transit of Mercury across the sun, and such an observation afforded me a strictly correct longitude. Altitudes above the level

of the sea, deduced from hypsometrical observations, were calculated according to the formula of Laplace, as modified by M. d'Abbadie.

Such were the means of which I availed myself for the purpose of determining my positions.

Before reaching Bihé I was surprised to meet the Cubango (Kubango) River taking its rise to the west and not to the east of that place, as all existing maps had led me to believe. This large river receives on the east a great affluent, the Cuito (Kwito), which unites its waters with the Cubango at a place called Darico. Within the wide fork which is formed by the two rivers, the Cuanza (Kwanza, or Quanza) takes its source as well as some of its smaller affluents.

It was here that I had occasion to remark a peculiar feature in the physical geography of this part of Africa, viz. the dovetailing of the sources of rivers which in the rest of their courses run in opposite directions. Close to the source of the Cuito rise three other rivers; two of which flow into the Atlantic by the Cuanza (of which they are tributaries), and one into the Indian Ocean through the Zambesi. The same feature is noticeable even beyond Lake Bemba, the Zaire and Zambesi as well as their affluents having their sources and mingling their streams near to the 12th parallel of south latitude. East of the River Cuito in latitude 13° and longitude 19° E. the Cuando (or Kwando, named Chobe by Livingstone, who saw it near its junction with the Zambesi) takes its rise. This is a fine, large, navigable river, watering a great extent of inhabited and fertile country. The Cuando receives several great affluents, as navigable as itself.

It was in this region, covered by forests and where the elephant still abounds, that I came across the Mueassequeres, a tribe of Ethiopian origin, of a yellowish-white colour. They are nomadic and perfectly savage, spending their time continually wandering in the region between the Cuando and the Cubango. There exists likewise another nomad tribe, the Mussambas, who are black, and who wander about to the south, making their raids as far as the country of the Sulatebele. These people are, however, quite distinct from the Massaruas or Bushmen of the Kalahari Desert.

The country between Bihé and the Zambesi is inhabited by three distinct races: the Kimbandes, the Luehares, and the Ambuellas. Another race is beginning now to settle there, and there is a considerable emigration of Quibocos (Kibokwes) coming from the north for the purpose of establishing themselves on the banks of the Cubango and the Cuando, in their search of lands more fertile than their own. I met large caravans of emigrants, and made a stay in their new settlements.

All the above-mentioned country is splendid, and very fertile; inhabited by people of a docile character, and susceptible of development. What struck me very much as regards these tribes was their fondness

for dress, a disposition which is certainly favourable for the prospects of future civilisation. We may consider that we have here a great prospective market for the consumption of European manufactures.

These tribes are governed absolutely by independent rulers, and they constitute confederations although belonging to different races. The missionary has never reached them, nor had any European been seen among them till my arrival; I, the first visitor, met with a cordial reception.

Travelling eastward, the Liambai is the first river met with beyond the Cuando.

As regards that part of this great river which I examined, and which before me had been visited by Livingstone, I have little or nothing to add as respects its physical geography, but much to say regarding its political geography. The reason of this is that Livingstone and I met there settlements of races of a very different kind, and of very different customs.

I fancy that the Liambai, where it describes its great curve to the westward, lies more to the west than Livingstone supposed. I had an opportunity of observing on the spot the reappearances of the satellites of Jupiter, and although errors of observation might have crept in, such errors would only tend to strengthen my opinion, inasmuch as every four seconds later that I might have seen the satellite would correspond to the distance of a mile more towards the west.

Between the 16th parallel of latitude and the Victoria Falls, a distance of 220 geographical miles, the river has seventy-two cataracts and rapids.

At the time the great English explorer first visited this part of Africa, it had recently been conquered by the genius of a great man, Chibitano (or Sebituane), who, having gained successive victories over the native tribes, induced them to confederate together, thus constituting a powerful empire. Six years afterwards, during the Zambesi Expedition, when he visited Chicheque (Sesheke), towards the end of the reign of the second Makololo king Chicretu (Sekeletu), Livingstone foretold, not merely the fall of the empire, but the extinction of the Makololos. In fact, in the course of the reign of the third king of this dynasty of conquerors, named Omboroh, the chief, he was murdered, and the Luinas, who were the former masters of the country, again took possession of it, after a sort of Sicilian vespers, when the few remaining Makololos were all put to death. Only a few of them succeeded in taking flight to Bihé, under the command of Siróca, who put himself at their head. Even these were destroyed in January 1878, close to the village of Muttambanja, on the right bank of the Cuando, when they attempted to fall suddenly upon those who are at present the owners of the country.

As is well known, the Makololos were not a single race. Sebituane

was born on the banks of the Gariep in the Basuto country, and succeeded through his genius in getting together an army composed of all the different races belonging to the south of Africa, an army with which he conquered the country of the Upper Zambesi, and to which he gave the name of Makololo. It is this same people bearing the name of Makololos, in former times so brave, and later on so weakened from the effects of fevers in the marsh lands of the Chobe and Zambesi, abased by licentiousness, and enfeebled by the use of *bang*, who are at last put to death by the assegais of the Luinas. The name Makololo, which is still improperly seen upon our maps, ought therefore to be obliterated, as the race has ceased to have an existence.

Whilst on the Zambesi I had the opportunity of again meeting with Machuana, who had been Livingstone's companion on his journey to Loanda, and who, being at that time a slave belonging to Sekeletu, is to-day an important individual in his capacity of a Luina. I may say that I am indebted to this man for my being still alive.

The brief historical sketch which I have just given will explain why new habits now prevail in this interesting region. A full description of the country and people, as of other parts of the interior which I traversed, must be deferred to the narration of my travels which I am preparing.

On the west the Zambesi does not receive between the Liba (Lecba) and the Cuando any other affluents except the Lungo-é-ungo, and the Nhengo. The latter is formed by the junction of three rivers: the Ninda, the Loati, and the Luanguinga. From the confluence of the Cuando as far as Victoria Falls, it receives only one small stream close to the cataract, the name of which I was unable to ascertain in consequence of the country being uninhabited.

South of the Zambesi and the Cuando, the land-surface of the country, which from Bihé had declined some 1200 feet, begins slightly to rise again, and exhibits a rich vegetation. But as far as population is concerned, this part of the country is a desert, and only two settlements are to be met with, constituting two small villages, Luchuma and Daka, the latter being situated on a different spot from the village bearing the same name, and formerly existing there.

The policy adopted by the Matabeli does not permit of the settling of any tribe on the southern border of the Zambesi. This powerful Zulu tribe look upon that great river as their natural frontier of defence against their enemies the Luinas, and even they themselves do not settle in that country, in consequence of the bad fevers prevailing all along the river banks. The soil, however, is fertile; but the country can never expect a prosperous future, not only in consequence of its climate, but because of the difficulty of access to it from any point on the African coast.

It was here that I came across Dr. Benjamin Bradshaw, a medical

gentleman who has exchanged the pleasures of civilisation for a rough life in the middle of an African forest. Being a clever sportsman, he lives principally on game, and on the proceeds of his sales at the Diamond Fields of the collections which he makes.

It has been already reported by somebody in this country that I have mentioned my having fallen in with a Portuguese explorer in evening dress with a tail-coat and white neck-tie, and that I had come across an English zoologist simply attired in a pair of trousers and in shirt-sleeves. The positions which these two gentlemen occupy are very different one from the other, and their characters are no less so. José de Anchietta, the Portuguese explorer, has been a resident in Africa for eleven years, and holds an official position under the Portuguese Government. He is aided by the Portuguese authorities, and is employed making scientific collections for the Zoological Museum in Lisbon. Dr. Bradshaw, the Englishman, is simply a private explorer, who travels about as he thinks proper, makes up collections for sale on his own account, and is not subsidised by anyone. He has become inured to the hardships of his solitary life in the region where, for the last five years, he has been leading a by no means enviable existence. The positions of the two gentlemen are therefore very different. The dispositions of the men are also different. Anchietta does not consider that the fact of his living in the forests of Africa should interfere in any way with his European habits. He acts, therefore, as he used to do in Lisbon or in Paris; wears his tail-coat and white neck-tie, and, although away from civilised centres, revels in his scientific books, and manages to keep up his studies as though he were in Europe. Dr. Bradshaw, on the contrary, has a taste for living in the bush in the same style as a native. Being a first-rate sportsman, he wanders in the primitive forests more boldly than a native, and takes quite naturally to existence in those savage regions. Such are the facts, and I had not the slightest idea of comparing characters, and far less of depreciating the high merits of my worthy English friend the Doctor, towards whom I shall always feel the greatest gratitude for the kindness bestowed upon me.

In that place, besides Dr. Bradshaw, I had the opportunity of making the acquaintance of a good and dear family, to whom I am indebted for my life, and consequently for the happy termination of my adventurous journey. I am speaking of the French missionary, Mr. Coillard, his wife, Mrs. Coillard, a Scotch lady, who kindly nursed me as if I had been her own son, and Mdlle. Coillard, the niece, a young French lady, who had the courage to become the companion of her uncle and aunt in such a fatiguing and dangerous journey.

I feel I never shall be able to express all my thankfulness and gratitude towards this amiable family.

It was in their company that I made my journey across from the Zambesi to the Bamangwato country, and visited the famous Makarikari,

the enormous basin into which run and are evaporated the waters of many different rivers coming from opposite points of African soil. There ends the Botletle, which is nothing else than the Cubango, after having made its passage through Lake Ngami.

On arriving at Shoshong, the chief town of the Bamangwato, I was surprised to find its position very different from that which it occupies on maps, as regards longitude.

My longitude here was determined by the chronometer, but a few days before that I had observed an eclipse of the first satellite of Jupiter, and during my stay at Shoshong, I observed that my chronometer kept very good time. Observations of this kind, however, are subject to rectification, and to correction from subsequent observations, which as yet I have been unable to compute. They will throw important light on the subject, and will either confirm or modify my opinion of the matter.

My journey from Shoshong to Pretoria was full of incident, and no less interesting was that from Pretoria to Natal, during which I was happy to have as companion a young English officer, Lieutenant Barker, belonging to the 5th West York, who shared my adventures.

I have not employed any but the native names in speaking of the new places which I have visited, and have kept to the names I found already existing. It was only to the country which I crossed between the Botletle and the Zambesi that I ventured to give a new name, viz. that of Baines' Desert; desiring to render honour to Thomas Baines, one of those who have most laboriously worked in the interior of Southern Africa, and one whose existence was, all through, full of misery and privations. I trust that his name will be allowed to remain graven in prominent letters on the maps of Africa, side by side with those of Livingstone and Stanley. I take the liberty of proposing respectfully to all Geographical Societies that my present suggestion be accepted, as a just tribute paid to the memory of that conspicuous English explorer.

The object of my journey had, according to the instructions received from my Government, a purely geographical character; and it was for such reason that I did not undertake any studies referring to natural history. The collections which I was able to make in this department are very small, and I do not know that they are of any importance. But with reference to this subject, I may mention having met on the Upper Cuando and its affluents with two antelopes which are probably not known to science, having been told that they are met with in no other river. The natives give them the names of Zuichobo and Dima. Although true antelopes, they live habitually in the rivers like the hippopotamus. I have given to competent persons an account of these curious animals and their habits, but have not yet received assurance as to whether they are, or are not, new species.

My diary, which, as I have had the honour to mention, I hope to see published very shortly, will contain lengthened descriptions of the different races, customs, and habits which I had the opportunity to observe during the course of my journey.

I take the liberty of forwarding, together with the present letter, my field-books containing my original observations, both astronomical and hypsometrical, also my maps and drawings and a portion of my diary, that they may help your Lordship and the Council to form an opinion of my African travels.

I could hardly find a better way of expressing my sense of the very high honour the Society has conferred upon me in giving me an opportunity of communicating this account of my travels to them.

I have the honour, my Lord, to be, with the highest consideration and respect,

Your Lordship's
Most obedient and humble servant,
ALEXANDRE ALBERTO DE SERPA PINTO.

Across China from Chin-kiang to Bhamo, 1877. By J. McCARTHY.

(Read at the Evening Meeting, April 28th, 1879.)

Map, p. 544.

I LEFT Chin-kiang in the middle of January 1877, and travelled by small native boat as far as Ngan-king, the capital of the Ngan-hwui province, and from there by steam to Hankow. Here I secured a boat to take me on to Sha-si, some 290 miles higher up the river. Being desirous, if possible, to get there before the Chinese new year, I decided to go by the canals and lakes which cut off the great bend of the Yang-tze at this portion of its course, thus reducing the distance by at least one-half. The main entrance to these canals is from 25 to 30 miles above Hankow. One branch terminates at Sha-si, while another empties itself into the River Han about 170 miles from Hankow.

We started from Hankow on February 2nd. The season of the year was not the most favourable for observation. It was stormy, and freezing very hard, so that we had frequently great difficulty in making headway; the waters of the canal in some places being frozen over for a considerable distance, and everything covered as with a shroud from continual and heavy falls of snow. The whole of the country around is low and marshy, and very sparsely populated. A great part of the district has the appearance of being frequently flooded, the people for the most part living on the embankments which restrain the waters of the canals. One or two of the lakes (as the Ming-yang-Hu and Chang-Hu) are large sheets of water stretching away as far as the eye can reach. At the time we passed through, they were very shallow; and in some

places it was only by very great care that a channel could be found for the boat.

Nearly half-way to Sha-si we put up for a few days at a busy market-town named Hwang-feng. Here were junks laden with rice from districts adjoining the Tung-ting Lake in Hu-nan, whose boatmen were disposing of their grain; Hu-pei boatmen from the surrounding country with boatloads of vegetables exposed for sale; these and the like, with eager chaffering purchasers, formed a motley throng, the lively scene cheerfully contrasting with the dreary waste through which, for the most part, we had been passing. I could but wonder how such crowds of people had come together, as we had not passed houses within a reasonable distance in number sufficient to lead us to expect such a concourse. We found that many of the people had small boats of their own, and that most had come from distant places to make their purchases for the new year. Although so near to Hankow, many with whom we had conversation knew nothing of that place, and had never seen a foreigner before.

Fifteen days' rather dreary travelling brought us to Sha-si. This is a large and important town on the left bank of the Yang-tsze, some $3\frac{1}{2}$ or 4 miles from the garrison city of King-chow Fu. Nearly as extensive, though not so populous as Hankow, Sha-si has three main streets running parallel to one another, each being nearly 4 miles in length. A high stone-faced embankment protects the town from the river. But for this, not only the town, but the plain in which it is situated, and the city of King-chow itself, would frequently be inundated.

Sha-si is only 2 miles from the Tai-ping Canal, which leads from the Yang-tsze into the Tung-ting Lake. It is therefore a point of great importance, being at the juncture of the water systems which connect the provinces of Sze-chuen, Hu-nan, and even Kwang-tung, with Hu-pei. From the top of the pagoda a fine view may be obtained, behind the town, of the plains of Hu-pei, low, flat, and uninteresting. Across the river in the direction of the Tai-ping Canal, the country is also low and marshy.

I left Sha-si for I-chang Fu, 70 miles higher up the river, on the 21st of February, and was five days on the way. On the right bank we passed the cities of Chi-kiang and I-tu. A little below the former city the low marshy character of the country changes; and on both sides of the river low hills showed that we were nearing the ranges of mountains which encircle Hu-pei, and join the higher and bolder ranges in Sze-chuen. We called at a few busy towns on the left bank of the river. At Kiang-keo and Tong-tsze were many boats laden with sugarcane and oranges. Pah-yang, some 30 miles below I-chang, was formerly a large and busy town, but having been submerged during a flooding of the river, it has never regained its former importance. It is only seven days' journey from Fan-cheng on the Han River. Near this place we saw men burning lime-

stone, and met numbers of oxen laden with the lime in panniers, which they were taking into the country to be used as manure for the land.

On February 26th we reached I-chang Fu. Some members of the China Inland Mission had been residing there for some months before I arrived, and were working on the most friendly terms among the people. It was not until the 20th of March that I left I-chang for Wan Hsien, 320 miles distant, the journey occupying fifteen days. Shortly after leaving I-chang, we entered that wonderful series of defiles and rapids which extend for about 100 miles, and which have been already described by the members of various exploring expeditions. From the nature of the country, the cities and towns met with on this part of the journey are not numerous. The small city of Kwei, prettily situated on the slope of a hill on the left bank, and the unwall'd Hsien city of Pa-tung on the right bank—both in Hu-pei—with Wu-shan Hsien, the first city in Sze-chuen, are the only places worthy of mention.

The 28th of March found me at Kwei-chow Fu. Like most we had passed in this part of the country, this city is about 3 miles in circumference, and is very densely populated. Outside the wall was a large movable suburb. This consists of streets, of shops, and houses of reeds and mud or matting, which are erected every year from the city wall down to low-water mark, and gradually disappear before the swelling river, which in the summer months reaches to and sometimes even flows through the city gates. This represents a rise of 45 or 50 feet. We spent a day or two in going freely about the city, of which the streets were well paved and clean. The people were very friendly, and glad to hold conversation.

Leaving Kwei-chow Fu, the river opens more; the mountains for the most part being some distance from the river, and the general appearance of the country, while still mountainous, not so precipitous as lower down. For the first time in this journey, I noticed the red flower of the poppy, which is here largely grown. Beans, peas, tobacco, and other crops also flourished. The land was well cultivated and fertile, the people comfortable and prosperous.

Passing Yung-yang Hsien, which has a large western suburb, we arrived at the city of Wan on the 3rd of April. The city proper is small and nearly circular, with large suburbs on the east and west sides. Iron, sulphur, and saltpetre are said to be found in the neighbourhood, and great quantities of opium are sent away from this place. The western suburb is separated from the city by a small river or mountain stream, nearly dry at the time of our visit, but said to be large and for some distance navigable during the summer months. This can only be true of boats or rafts of the lightest draught.

So far my journey by river had been most enjoyable, but desiring to see more of the country and people, I determined to go by land from this place almost due west, to the prefectural city of Shun-king, some

270 miles distant, sending my boat on to meet me at that place. My preparations for the land journey were soon completed. They consisted mainly in reducing my "impedimenta" to such limits that if necessary I could carry it all myself.

Leaving Wan Hsien on the 5th of April, our road at first lay through a beautiful fertile valley, with villages and towns almost every mile of the way. We continually met parties of men carrying beans, peas, rice, coal, paper, and bean-curd (a species of cheese), towards the city. Going in our direction, men carrying goods were nearly as numerous. Their loads consisted of cotton, salt, iron, and other articles. This valley only extended some 15 miles, the road then winding up among hills, and the towns becoming less numerous. Many a comfortable farmhouse could be seen at short distances from the road. The wonderful way in which the Chinese farmers utilise land that will grow anything is here well shown. As I walked along the road (which was sometimes on the sides, sometimes on the tops of the hills) I had good opportunities for observing the country, and there did not seem a bit of land uncultivated. Wheat, rape, peas, beans, and poppies covered the whole landscape, except where the rice grounds in the valleys were being prepared for the crop. On the top of the higher hills, the rugged granite rocks lay uncovered, frequently forming large level platforms. These had in some instances been walled round, and were formerly used as places of retreat for the people in troublous times. For about 20 miles from Wan the road presents a good level pathway of granite rocks; and, like so many works of the kind in China, owes its origin to the efforts of a private individual. Mr. Wang, the maker of it, though not a wealthy man, has, by patient perseverance and plodding industry, accomplished a work which is likely to cause his name to be handed down to posterity as a public benefactor.

We found good accommodation at the inn at "the dividing of the waters," 30 miles from Wan, where we put up for the night. Our fellow-lodgers numbered about 120, and there were several other large inns in the town also filled with travellers. The hills along which we had been walking proved but a spur from a range which we had now to cross. Immediately upon leaving Feng-shui the road began to ascend, having alternately steep ascents and slight depressions, but all the way getting higher. Wherever the hills were steepest and most rugged, they were covered with fine fir-trees, or bamboos of a very large size. Generally, however, the sides of the hills were under cultivation.

On the way we passed some coal mines, if openings into the sides of the rock may be dignified with such a name. The men go in on all-fours, clearing their way before them. Sometimes the hole is made large enough for the man to stand up, and the broken coal is dragged out by the miner, in baskets which have wooden runners to make them go easily. The men go on working at one spot till it becomes dangerous, or till they exhaust the supply at that particular place.

A descent of 15 miles brought us to Liang-shan Hsien, a city with large suburbs on three sides. It is situated close by the foot of the hills we had just crossed, and near the boundary of a somewhat circular plain 10 or 12 miles in diameter. The city and suburbs, as well as the surrounding country, are well populated. For the encouragement of future travellers, I may mention that here as elsewhere I found an abundance of good wholesome food. The prices when mentioned in London will appear simply absurd: good beef and mutton, as well as the never-failing pork, were from 2*d.* to 3*d.* a catty (equal to our 1½ lb.); eggs were five a penny, and other articles in the same proportion.

Crossing the plain, our road again led over well-wooded hills for 16 or 17 miles. For about 4 miles there were very steep ascents and descents, in some places consisting of a series of stone steps, with varying distances of winding road between. The steps number some thousands in all; they are an enduring memorial of the industry of past generations, but no small tax on the strength of the traveller. Yet over these steps men carry burdens that are truly surprising. Our path then lay along the tops of the mountain ranges, which were between 2000 and 3000 feet high. Here the walking was easier, and rendered enjoyable by the beauty of the scenery. Having a good view of the country, it was easy to see that the reports of the extreme fertility of Eastern Sze-chuen were not at all exaggerated. It seems to produce everything needful for the inhabitants. The people are particularly industrious and laborious. We met quite young boys carrying loads of coal over hills that we found it hard enough to climb without any burden. The coolies are generally fine tall fellows, but with a careworn, anxious look, the result doubtless of carrying such heavy burdens over such heights.

Ta-chuh Hsien, the city next reached, is, like Liang-shan, situated in a plain some 10 or 12 miles in diameter. It seems to be mainly a market-place for the surrounding districts. Tobacco was here, as elsewhere on this route, everywhere exhibited for sale, and we saw a great deal growing. All, including the merest children, smoke; and it was a matter of surprise to them that the "venerable foreigner," as I was called, never indulged in its use.

From Ta-chuh to the River Kii (this river is named differently, according to the city near which it flows) was 60 miles. This river, a short distance above Ho-chow, joins the Ho, which empties itself into the Yang-tsze at Chung-king, separating that city from Li-ming Ting. The country as we advanced was still hilly, but more broken. I did not go by the direct road to Shun-king Fu. Having received an invitation from a Chinese friend to visit his home in the Kwang-ngan-chow district, I went out of the direct way, and remained ten days at *White Cloud Retreat*, about 25 miles distant from the city of Kwang-ngan. In the large plain in which this latter town is situated, the poppy is the principal crop under cultivation, and opium smoking is very prevalent. The natives are a simple agricultural people, and most hospitably

inclined. If I had accepted all the invitations I received, my visit might easily have been extended into months. The main, indeed only, trade of Kwang-ngan is opium.

For 20 miles between Kwang-ngan-chow and the Hsien city of Yoh-chi, we travelled through a rather level plain in a north-westerly direction. Many towns with well-cultivated lands around were passed on the way.

We were at Yoh-chi on a market-day, and the people being in from the country, the city was literally crammed. The "north street" is a particularly fine one, broad and well paved. Piles of linen and calico were set out for sale in the streets. A good deal of hemp is grown around the city. All the rushes used for oil lamps at Hankow, and even beyond, come from this place. We met many people carrying stacks of these rushes for shipment down the river.

Leaving Yoh-chi, and still going in a north-westerly direction, the country again became hilly. For the greater part of 50 miles the road winds round the brows of hills, occasionally dipping down into the valley, but soon ascending again. The bare rock was more exposed than at other parts of the way, and yet, even when the earth was very thin indeed, there were crops of peas and other vegetables as well as barley and wheat sown. In some places on the way they were reaping the barley. The weather was very hot.

On the 24th of April I arrived at the left bank of the River Ho, opposite Shun-king Fu. This city has a suburb extending about $2\frac{1}{2}$ to 3 miles along the bank of the river, in which the main business is done. There is a large trade in hong-hwa, or saffron-flower, which is extensively cultivated in the prefecture, and sent to Chung-king and other places to be used for dyeing silk. It is only six days' walking distance from this place to Cheng-tu Fu, the capital of the province.

Leaving Shun-king, I proceeded down the River Ho. Later in the year there is a large volume of water in this river, but in April it is shallow and full of sandbanks and rapids, for being very tortuous in its course (at some places almost forming peninsulas), great sandbanks form at the bends which further impede the navigation of the river. Passing the large and important city of Ho-chow on the way, I reached Chung-king on the 1st of May.

Chung-king is situated on high ground, on the left bank of the Yang-tsze, at the point where the Ho River joins it. Being the natural centre towards which not only the trade of the province of Sze-chuen, but also that of considerable portions of the provinces of Yun-nan and Kwei-chow tends, it is undoubtedly the most important city of Western China, and well deserves the attention which has of late years been directed towards it. A forest of masts of vessels here anchored, not only in the Yang-tsze but also far up the Ho River, plainly indicates the immense traffic of which Chung-king is the centre.

Having to make preparations for continuing my overland journey from Chung-king, I engaged two coolies to carry my luggage, taking care to select men who did not smoke opium. They were each to have about 17s. a month, and food. One of these men carried the bedding and two small white leather boxes which formed the whole luggage of myself and the Kiang-su friend who accompanied me. My bedding consisted of a couple of pounds of cotton wool quilted into a cotton cover for a mattress, a good warm Scotch plaid for coverlet, and my extra clothing in a bundle as a pillow. My leather box contained a few books, pens, ink, paper, a manifold writer, and a few other necessities, none of them very heavy. A few lumps of silver brought up the weight to quite as much as the men cared to carry. Many things that had been useful and convenient on the boat journey were left behind in a house which we had succeeded in renting for mission purposes during our residence in the city. In the absence of suitable money for carrying on a journey, which the Chinese do not possess, I had procured some ingot silver, and getting it cut up into convenient pieces for changing, had it sewn up in little pockets in my Chinese wadded jacket.

Thus equipped, we left Chung-king on the 10th of May, crossing the river and going almost directly south. We had to pass over a high range of hills which skirts the right bank of the river. There was a great contrast between the appearance of the country here and that through which we had already passed. In a day's march of 20 miles we only saw two towns of any size beside the one we put up at for the night.

I spent a few days at Khi-kiang Hsien, a city 60 miles from Chung-king. It is built on the banks of the River Khi, which runs into the Yang-tsze on the right bank some distance above Chung-king. There were more than a thousand students gathered in this city for examination.

Skirting the Khi River for some time, we crossed a mountain pass. The road consisted of more than 2 miles of stone steps up, and quite 3 miles down on the other side. The scenery along the river was very grand. Bold and craggy rocks, caves dripping with water and lined with maidenhair and other ferns,—numerous rapids, broken by large pieces of rock and boulders standing out of the water, making the passage of the river dangerous,—these formed some of the interesting features of the scene.

On the 15th of May I crossed the boundary of the Sze-chuen and Kweichow provinces. The hills daily became steeper and bolder, having numerous barren peaks towering aloft hundreds of feet above the road. At some places the hills are well wooded, but the general aspect of the country is wild and barren. Passing through mountain gorges, and crossing a pass where we found it extremely cold, we rather suddenly descended into a plain in which is the city of Tong-tze. This is a poor miserable place, having suffered much during the years of the Miao-tze

rebellion in the province. Indeed everywhere could be seen evidence of the terrible struggle which had taken place. Whole districts have been depopulated, the people having been either slaughtered or scattered. The government is said to be desirous of encouraging immigration, offering free grants of land and loans of money and cattle. If such benevolent intentions exist, the people generally do not know of them, or else do not care to take advantage of the offer.

From the foot of the hills we passed through a valley 8 or 9 miles in length, the whole of which as far round as the eye could reach was under one crop—the poppy. At the other side of the valley we reached Tong-tze Hsien, finding the place full of people who had come to sell opium, as it was market-day. The business of the place is chiefly done in a suburb newly built. As is, I believe, usual in all districts where opium is grown in China, the opium smokers are fearfully numerous and continually increasing. The quantity consumed must be enormous, and the smokers quite five or six-tenths of the population.

Continuing our journey towards the prefectural city of Tsun-i, opium was still the one crop in the fields. The used-up stalks and heads of the plant lay along the road drying, to be used for fuel. The seeds from these were eagerly eaten by the troops of coolies who were carrying salt from Sze-chuen. Daily we met hundreds of these burden-bearers, staggering under their heavy loads, some having 120 to 150 catties (160 to 200 lbs.) piled up on the wooden contrivance which they carried on their backs. Lads of ten or twelve years of age might be found in the gangs, carrying their load of 50 catties.

At a market town on the way we had evidence that the character for fierce and rude behaviour given to the Kwei-chow people by their Sze-chuen neighbours was not undeserved. During our stay, there was a regularly organised faction fight. It appeared that questions concerning land were (as was the case on this occasion) the cause of frequent and fierce disputes, during which periods of excitement it is by no means an infrequent occurrence for the people to use knives. The butchers accordingly put all their knives away at the beginning of such disturbances.

Tsun-i Fu is about 200 miles almost due south from Chung-king. It is a busy city, though not a large one, lying in a beautiful situation between two ranges of hills. A more recent addition to the older part is called the new city, and is walled round. This part is principally occupied by Sze-chuen people, the inhabitants of the old town consisting of Kwei-chow men, and some few Miao-tze, or aborigines of this part of the country. The Sze-chuen immigrants have a profound contempt for the Kwei-chow people, while these latter look upon the efforts of the Miao-tze to regain their freedom as brigandage, and call them thieves. The inn accommodation along this road is chiefly supplied by Sze-chuen men, many of whom, as well as some of the natives of Hu-nan, have

settled on the waste lands and brought under culture the greater part now in use.

From Tsun-i to Kwei-yang the capital, is nearly 110 miles, the direction being south-westerly. During this journey of five days we had fresh and ever-increasing evidence of the sad havoc made during the rebellion. On the second day we crossed the Wu River by a ferry boat. This river, some 700 or 800 miles in length, after running in a north-easterly direction in the province of Kwei-chow, and in a more northerly course in the south-eastern corner of Sze-chuen, empties itself into the Yang-tsze at Fu-chow, some distance below Chung-king on the right bank. The further we proceeded, the fewer were the evidences of the tides of immigration we have referred to, until at length an occasional walled town with guard posts between, and a small camp or two at various points, were almost the only evidences of life and activity. Here and there on the road, from 5 to 10 miles apart, we passed a few wretched houses, relics of formerly flourishing towns or villages.

Some 5 miles from Kwei-yang Fu, at the top of a mountain pass, the road led through a fortified gateway, which forms the northern defence of the city. The city is situated in the centre of a plain running north and south, completely surrounded by hills, the longest diameter of the plain being about 8 or 9 miles. It is by no means level, the inequalities rather heightening the beautiful effect of the whole scene as viewed from our standpoint. Formerly the hills on all hands were well wooded, but the dire necessities of war demanded that there should be no cover left by which the rebels might come near the city, so for the most part the trees had been destroyed and the landscape proportionately disfigured. Descending into the city, we were surprised to find that though the provincial capital, it is of little commercial importance, the trade of the place being mainly confined to supplying the country districts around. No letters of credit could be got on Yun-nan Fu, as there was no trade whatever in that direction, the usual trade-route from Sze-chuen into Yun-nan being via Sui-fu Chow-tung and Tung-chwan Fu.

On the 7th of June I left Kwei-yang, travelling westward towards Yun-nan Fu. At no great distance from the city, the country presented a very desolate appearance, similar to that on the road from the north.

As if to make up in some degree for the dearth of the human element and its accompaniments, wild flowers of various kinds were very numerous. Indeed, all the way through the province of Kwei-chow it would be no figure of speech to say that our path was strewn with roses; wild roses, buttercups, daisies, hawthorn, and various other blossoming plants abounded. The way did not seem half so long or wearisome along those flowery roads and amidst the delicious fragrance. Blackbirds, thrushes, and a host of other songsters cheered us as we walked. There was one bird especially, with a peculiar song, reminding

me of the American whip-poor-will, but having four notes instead of three, which he kept continually repeating. Though late in the season, the cuckoo's note was frequently heard. I had found it very hot in Szechuen, but the weather here was quite temperate, owing to the greater elevation. The physical features of this part of the country have been well described by the late so justly lamented Mr. Margary.

As we neared Ngan-shun Fu—60 miles from Kwei-yang—the road passed through well-cultivated and thickly populated districts. It was quite a relief to see in the valleys that opened out on each side a goodly number of towns and hamlets. During the greater part of the day on which we reached the town we were passing through a narrow valley. Most of the houses about here are covered with thick slabs of slate of an irregular shape, which imparted a comfortable appearance, though they look better at a distance than on a closer inspection.

It was fair day when we arrived at Ngan-shun, and great numbers were assembled, many having come from long distances. The fair is held inside the east gate of the city; and as we walked up that which had formerly been an extensive suburb, but has now been turned into a vast graveyard, the hum of the voices of hundreds of people could be heard even before they themselves could be seen. There were a goodly number of black Miao-tze (thus named from the colour of their dress), who came from the hills. Also Cong-kia-tze (descendants of Chinese who intermarried with the Miao-tze, but are now keeping themselves distinct from both) from the surrounding country, who came in to make purchases. This city was not captured during the rebellion, although the extensive suburbs were all destroyed. It is consequently in good preservation, and very populous. Next to the capital it is the most important city in the province. The main trade is in opium, but this year the poppies had been destroyed by hail, and so numbers who would otherwise have come to sell or buy were absent. Many Kwang-tung and Kwang-si men buy up large quantities of opium, carrying it to Canton, from which place it is said to find its way as far up as Shanghai. Formerly as many as two thousand of those men would travel together, and as they are all armed with long spears, the handles of which are used for carrying their baskets, they present rather a formidable appearance. Many of them also carry pistols (probably procured in Canton) or swords. The military authorities have recently issued orders forbidding them to travel in such large numbers.

Leaving Ngan-shun on the 11th of June, we travelled for some 20 miles over an almost level road, passing a walled town on the way. The country is pretty well cultivated, but the villages are poor, and have a dilapidated, uncomfortable appearance. In the fields we noticed lifts for raising water from wells, very similar to those in use at Singapore. A long bamboo is so balanced near the centre on an upright post, that when raised at one end the other end dips down, and allows a bucket

attached to it to descend into the well. A heavy stone is used to balance the water, and raise it to the surface.

Chin-ning Chow, next reached, has just one long up-hill street remaining, the other parts of the city having been destroyed. It was sold by the people to the Mahomedan rebels.

As we approached the boundary of the Kwei-chow province, the difficulties of travel rather increased. The mountain ranges were higher, and while there were still many long stretches of level road, the increased frequency and steepness of the ascents were very noticeable. The valleys for the most part were cultivated and the hill-sides covered with trees. We crossed the boundary on the 22nd of June, at a place where a stone wall, in which is a gateway, is thrown across the mountain pass. A temple erected to the god of war stands on a level platform in the small village on the top of the hill. Four stone animals, supposed to be lions, two turned towards Kwei-chow, and two towards Yun-nan, are placed so as to guard the road in each direction. They are said to show the difference between the lions of the two provinces. They are indeed unlike each other; but bear little resemblance to the animals intended to be represented.

The roads leading from Ping-yi Hsien, the first city we come to in Yun-nan, nearly to the capital, Yun-nan Fu, are broad unpaved tracks, and are therefore more difficult for walking than the roads in Kwei-chow. At short distances, often within call of each other, huts were erected where soldiers kept guard. Here, as elsewhere, the travellers with whom we happened to be in company, were astonished that, passing through such a country, we displayed no arms for self-defence. All the parties we met, or those going in our direction, carried arms of some kind, many of them taking particular pains to show that their old horse-pistols or muskets were really useable, by firing them off occasionally. Others were rather pleased to display their Shan swords. That our party should not parade such articles was after all not so very wonderful, for we had none to parade. Had I supposed that it would be necessary for our safety at any part of our course to make an armed demonstration, the journey would not have been undertaken. Several years' experience has only confirmed my previous deeply-rooted conviction, that the truest protection for anyone travelling among strangers, is the knowledge on their part of the fact that *he can do them no harm*. The more he can make this apparent, the better it will be, not only for himself, but also for any that may follow after. My coolies even were made to understand clearly, that if from any cause they got quarrelling with fellow-travellers on the way (as proved frequently to be the case with others), I would at once dispense with their services; hence, I had no trouble on that score, having only to remind them of their agreement, whenever I saw a tendency on their part to make capital of the fact that they were following a foreigner.

Entering on the plain, at the head of which stands Yun-nan Fu, we soon reached the city. The southern portion of this plain is occupied by a lake or sea, as they call it in Yun-nan. The city of Yun-nan had formerly large suburbs on the south side extending for 3 miles from the gate, but most of these streets and houses were destroyed during the times of the Mahomedan rebellion, and, I am afraid, are likely to remain in their present dilapidated condition for many years to come. On a hill near the centre of the city stands a temple, from which a good view can be obtained. The city itself is not more than $3\frac{1}{2}$ miles round the walls; the population nearly all residing in the southern quarter. A large swampy lake fills a great portion of the north-western part of the city, and the eastern division is mainly under cultivation. The number of official people residing in the city is very large, as well as of expectant civil and military mandarins. The streets are thronged with these and with soldiers. I got quarters in a comfortable hotel, where I met some friends from Kwei-chow I had made when there, some of whom took me to see a temple near the marshy places in the north parts of the city. Within its precincts there is a pond with thousands of fish saved from an untimely end by pious worshippers, who purchase them in the market alive, and consign them to the care of the priests. The fish are continually being fed by those who come to look at them.

My landlord was a venerable old man, with a long white beard and moustache, whose foreign appearance appeared a source of great pride on his part. He was a total abstainer, even from tea and tobacco, water being his beverage. He had met the members of the French Expedition, but lamented that none of them could speak Chinese. He was a fine, healthy, clear-headed old man of over seventy years. I remained with him ten days, and then, with mutual expressions of regret, we parted.

I left Yun-nan Fu by the west gate, and, passing through a level and well-cultivated plain, came to a low range of hills running nearly north and south. The people in this plain were only now planting out the young rice. Turning off sharp to the south, the road ran parallel with these hills for some 6 miles, and then, bending westward again, crossed the hills at their lowest point.

Proceeding inward in a general south-westerly direction, we passed several groups of mules and donkeys carrying Burmese cotton to Yun-nan Fu. For several miles our way next lay to the west through forests of fir-trees. Then the road, ascending the mountain ranges, turned more to the north. For the most part we had steep and rugged hills to ascend, occasionally descending into valleys, through which streams ran merrily along, followed again by steep and difficult passes, which taxed our powers to climb.

I met General Yang, the highest military officer in the province, on his way to the capital. If common report be true, he is not only one of

the ablest, but also the wealthiest man in Yun-uan. A great deal of property confiscated at the close of the Mahomedan rebellion has either fallen into his hands, or else he takes care of it for the Government. He keeps hundreds of mules for the carrying trade between Burmah and Yun-nan. He had a large following, many of his guards being armed with handsome foreign-looking rifles. Numbers of coolies were in his train carrying slabs of marble and thick planks of a particularly heavy white wood; indeed, for several days we met men thus laden. It was said that the General was taking these things eastward to be given as presents to some of his official friends. This wood is held in high esteem for coffins, which it is quite according to Chinese custom to prepare beforehand.

On the 16th of July we reached Luh-fung Hsien. The road approaching this city skirted a range of hills which bounded a well-cultivated plain, dotted with villages, extending for some distance to the north of the city. Although the country around looked well, the city itself has the usual dilapidated appearance of the other cities in this part of the country.

The presence of an official with a large following, on his way to Yun-nan, caused us to have some difficulty in securing a lodging at this place. All the regular inns being full, we were thankful to get an impromptu resting-place in the kitchen of an opium den. The rain descended heavily during the night, and I was awakened by the dirty sooty water coming through the roof on to my face. To increase the pleasure, the clay wall, having become saturated with water, fell in upon the bed. Finding that there was a dry place in the middle of the floor, I got a tub and placed it there, and putting some boards on it, formed a bedstead on which I rolled myself up in my bedding, and was soon asleep again. I had several experiences of a similar kind on the way, as I never looked for more accommodation than a Chinaman would expect; generally, however, we were fairly housed.

A detailed description of this part of the journey is rendered unnecessary by the recent publication of Mr. Consul Baber's admirable Report, illustrated by route-maps containing not only the names of cities and towns along the route, but the heights of the mountain ranges and passes fixed with scientific accuracy.

Passing Luh-fung Hsien, the extent of land under cultivation is but limited. The plains in which the cities are situated are utilised, but the intervening mountainous country is of a nature to preclude any effort at cultivation. Narrow valleys, in which are a few hamlets, are succeeded by steep mountain and in many places dangerous passes. The people of these districts have a most vivid remembrance of their sufferings during the Mahomedan rebellion; the universal testimony however being that they had suffered as much from the imperial soldiers as from the rebels.

The road to Teng-yueh-chow from Hsia-kwan near Ta-li is the most difficult part of the journey through Yun-nan. The mountain ranges are higher, and more difficult to surmount, and the valleys through which the large rivers flow are notoriously unhealthy, especially during the season of the year in which we were on the road.

Leaving Hsia-kwan on the 1st of August, we reached Yung-chang on the 10th and Teng-yueh on the 15th of the same month. During the first part of the journey, we followed the course of the river which flows out from the Ta-li Fu lake westward. The road was high up the sides of the hills, and on the opposite side of the valley we could see the snow-clad ranges that run north and south lying between us and the city of Ta-li. Having made an almost perpendicular descent to its banks, we crossed the river, and then passed on in a little more northerly direction, our way still being by the side of a stream.

Approaching Yang-pih-cheng, we passed through groves of fine walnuts, persimmons, and other fruit-trees. The cactus, with its yellow blossoms, abounded, growing to a very large size, and being much used to form boundaries between the different farms. We frequently met pedlars from Sze-chuen, selling tapes, thread, &c., which they carry all over this region, and into the Shan States.

There is a road across the hills, through a pass, leading to Ta-li from Yang-pih. Leaving this latter town, we crossed a chain bridge which here spans the river. It is a safe and well-built structure. Continuing our journey through Yung-ping Hsien, we had a half-day's very steep climb, and reached a level, which we pretty well maintained all the time we were in Yun-nan, except when crossing the valleys of the Me-kong and Salween rivers. Passing Sha-yang, a large town, we came across droves of bullocks, rather like the Alderney breed, which are used to carry salt and other goods to and from Yung-chang. The salt was in panniers, and between these, over the animal's back, was a kind of belfry, with a bell in it (not unfrequently a little cracked), which tinkled as the cattle walked forward.

A rather steep descent brought us to the Me-kong, which we crossed by a chain bridge. The chains are stretched across, and planks laid on. The stream is 180 feet wide where we crossed. We soon found ourselves in a fertile valley, at one side of which stands Yung-chang Fu. This valley is between 5 and 6 miles in width, and perhaps about 16 in length. From the rising ground it seemed covered with fair-sized towns; a near approach showed, however, that, with one or two exceptions, the prosperous appearance was more apparent than real, though the district was certainly better than any of those we had passed through for several days.

Yung-chang is situated on rising ground, the wall running up the side of a hill. The southern portion of the city was well filled with busy throngs of people, and during the caravan season must present the

appearance of a prosperous business town. The dialect of this city is almost identical with that of Nanking. This was so striking, that when the Nanking man who was with me went out to make some purchases, I fancied several times that I heard him speaking outside the door of my room, but found that I had mistaken the voice of a native of the place for his. It is called "Small Nanking" by some, and the reason given by those to whom I spoke for the identity of dialect (for it was more than resemblance) was that Yung-chang and its neighbourhood had been largely peopled by immigrants from the Kiang-su province. There may be difference of opinion on this matter; I give the reason mentioned to me by several intelligent Chinamen to whom I spoke about the point. The inn accommodation here was the very best we had found on the whole journey, the inns being large and spacious, and, for China, remarkably clean.

Leaving Yung-chang, our way was southward for a few miles through the plain, then turning off to the west, we began at once to ascend among the hills and over the mountain ranges that lie between the city and the valley of the Salween. Crossing a narrow plain or two between ridges of hills, we passed through Pu-piao. I confess I was a little anxious for my men during this portion of the walk. The accounts they had received had been of themselves sufficient to predispose them to illness, and the appearance of the hills round Pu-piao was anything but reassuring. Laid out on the sides of the hills over which we passed, we saw hundreds of new coffins, containing the bodies of those who died of plague. In the road, also, tables, chairs, and stools were thrown about in a most extraordinary way, the explanation being that this terrible plague had been raging for months (it was said to be common to the district), so that even the furniture of infected houses was ejected by the terrified survivors. Many of the people were camping out on the hills, the officer in charge himself being in a temple on an adjacent hill.

The account of this malady given, was that after a day or two of lassitude, those who were attacked with the disease were seized with a raging fever, and in a short time a large purple spot made its appearance on their bodies. If this spot came out near any important organ, the case generally proved fatal; if on the arms or legs, the victim might recover.

The men were fortunately more concerned about the fancied dangers of the passage of the Salween Valley, than they were about the real dangers through which we were then passing. Not many miles from this plague-stricken district, we at length reached the Salween. It was reported that to wash in any water to be found in this valley, would produce a crop of boils, usually ending in mortification and death; and that if while passing across any rain should fall, and be followed by sunshine, instant death would be the fate of the hapless wayfarer. I

had the extreme gratification of proving to my companions that these were all exaggerated reports about an unhealthy district. We had both rain and sunshine while crossing, without any of the predicted results. The River Salween is here spanned by a double chain-bridge.

Two days clambering upwards, and then half a day's descent, brought us within sight of Teng-yueh-chow, or Momein, which is situated in the centre of a large and fertile plain. The city is surrounded by a well-built wall, and forms a square, each side being about 2 miles long. There are four gates, but only two of them are now in use, the principal of which is the south gate. This gate faces the road to Bhamo, and the markets are held outside it. The city is in a rather ruined condition. The soldiers who accompanied Mr. Grosvenor's mission through the Shan States, being unable on their return to get their amount of pay, were assisted by other malecontents in taking possession of the city, murdering some of the officials. The imperial troops sent to fight against them had to blow up the wall at two places before the rebels could be dislodged. The leader was taken and beheaded, and many of his followers are now in the Shan States, or have retreated into Burmah, and are public nuisances wherever they go.

We left Momein on the 17th of August. For some time after leaving the Teng-yueh plain, the road led through wild and barren country. Gradually the valley opened out, the Ta-ping River running down the centre. Several Shan villages were passed, surrounded by walls to protect them from the depredations of the Kah-chens, who live up in the hills at either side of the valley, and occasionally come down in force for plunder. The Shans are a comfortable people, well dressed and well fed, forming a striking contrast to the poor miserable Chinese found in their districts. Yet these ragged "Sons of Han," speak in the most disparaging way of the "White Barbarian," as they call the Shan, the reason being that these latter know no more of the writings of Confucius than themselves. We passed some hot sulphur springs, the waters of which are used medicinally by the people. We had to walk right through several rough mountain torrents, which interrupted our path, the water coming nearly up to our chin. The roads being the only watercourse, and much rain having fallen, our only way was to go on through the water, wading up to our knees for hours together. This was the Lan-ting or Nan-ting Valley, and we passed the walled town of that name some 30 miles from Teng-yueh. Here the Chinese have their own officials, and there are streets full of Chinese as well as of Shans and others, who are living there.

Passing Nan-ting, I spent a few days in a Shan village, on the top of a hill a little distance away from the road. I had hoped to secure the services of the son of the headman to guide me to Bhamo, as I found he knew the road, having travelled along it frequently. The negotiations broke through, however, as he seemed to have a rather

exaggerated idea of the importance of our having him as guide. This being so, I preferred being without him. I was glad to have spent a little time with his family. They seemed really devoted Buddhists, having religious books in their own language, and a better understanding of their religion than the generality of Chinamen seem to possess. Of course I could have known nothing of all this, but that this young Shan was able to speak a little Chinese. There seemed to be more affection also amongst the various members of the family. My Nanking companion was horrified to find that the young people selected their own partners for life, instead of leaving the matter altogether to the arrangement of parents, as in the "Flowery Land." He thought it showed a great disregard of propriety. I took it rather as an evidence of great common sense.

Leaving this village, we crossed the range of hills dividing the valleys of Nan-ting and San-da, and stayed a few days in the latter town. On the market-day the place was crowded with a motley throng. Shans, Kah-chens (Kakhyens), "Lee-saws," all meeting together. The "Lee-saws" are hill people like the Kah-chens.

From this place we got a boat to Man-wyne. It was merely a large tree hollowed out. We allowed an old Chinaman who had lived for years at Man-wyne to be our fellow-passenger. His forefathers having come from Nanking, he had become very friendly with my Nanking companion. With him we made arrangements to get a safe conduct across the hills for a few rupees, so that before we had taken our supper at Man-wyne he had settled everything satisfactorily for our progress.

Our arrival at Man-wyne excited a little comment, but as I at once put into circulation among the Chinese some literature which I had reserved for the purpose, and which showed satisfactorily the nature of my mission, the suspiciousness of the people seemed to pass away. After a little searching I got a lodging in an old widow woman's house. She was a devoted Buddhist, and was loud in praises of "the venerable foreigner," who had travelled so far to teach the people to be virtuous. Here for a few days I held receptions from morning till evening, great numbers of the people coming to see and talk to the man who had walked across their "honourable country." I found that many of them had been to Bhamo, and that they spoke in a very appreciative way of our medical mission at that place.

I had sent a card to the military mandarin in charge, excusing myself from calling on him on account of my travel-stained condition. He sent a most friendly reply, telling me to be sure and get a proper escort before crossing the hills, and sending kind messages to the members of the China Inland Mission at Bhamo, whose hospitality he had enjoyed when on his way down to Mandalay the year before.

During our stay, my Nanking friend bought some eggs from the mother of the man who is said to have killed poor Mr. Margary. Some

of the people seemed desirous to refer to Mr. Margary's murder; I did not deem it wise to do so, but always spoke of it as a thing that was long passed, and said that a better understanding now existed between England and China, so that nothing of the kind could occur again.

The Kah-chen chief and his party were ready to leave on the morning of the 24th, and, starting on that day, we walked across the plain from Man-wyne, and were soon among the Kah-chen hills. The men carried our things in small bundles in baskets on their backs. Travelling in single file, the chief's lieutenant and four other Kah-chens led the way, and we ourselves followed, the chief bringing up the rear. As the road wound up the hills, the chief gave me his spear to use as an alpenstock. He spoke a little Chinese, and relieved the way by giving an account of the attack by the Chinese on Colonel Browne's party. His father, since dead, was a chief who helped Colonel Browne on that occasion. The thing that seemed to have fixed itself indelibly upon the mind of this young chief was the execution done among the Chinese by the Sniders of the English party.

Resting among the hills for lunch, we passed on to the house of a friend of his, where we remained for the night. Here we had an opportunity of proving the general accuracy of the description given of these interesting people in Dr. Anderson's book, 'Mandalay to Momein.' They were extremely hospitable, and seemed only anxious that more Englishmen should come among them. That this affection is perfectly disinterested I should hesitate to assert. It would seem that the hill-men lost nothing by either Major Sladen's or Colonel Browne's expeditions in a monetary point of view, and they have been in a more independent position as regards their Chinese and Burmese neighbours ever since.

Another day's journey brought us to the chief's own house, and the next morning we walked into Myn-thit. Here we hired a small boat, and, floating and paddling down the Ta-ping and Irrawaddy rivers, reached Bhamo on the morning of the 26th August, 1877.

In concluding this paper, I may be permitted to mention that my object in travelling in Western China was purely and simply a missionary one. I was therefore chiefly desirous to have free and happy intercourse with the people, while, at the same time, glad to obtain geographical and general information. The more frequently foreigners can travel among the people without exciting hostility, the sooner will the time come when, without let or hindrance, a more thorough and scientific knowledge of the country will be obtained. Looked at from this point of view, even such journeys as that which I have attempted thus briefly to describe may have a certain scientific as well as missionary value.

It will be remarked that I walked the whole of the land journey, and that I was therefore continually before the eyes of the people. It will be to many who are acquainted with Chinese travel a matter for

surprise when I mention that, during the whole course of this long journey I was not once called upon to produce my passport, nor had I once to appeal to any official for help or protection. From the people everywhere I received only civility and kindness.

I may further state the journey it was my privilege to make is but one of many which, within the last three years, have been taken by the members of the China Inland Mission, with which I have the honour to be connected. Every province in Western China, as will be seen from the map we have published, has been visited. In Kausuh, in Western Sze-chuen, in Shen-si and Shan-si, through Hu-nan, Ho-nan, and Kwang-si, as well as Kwei-chow and Yun-nan, the members of our mission have been permitted to make journeys which together represent more than 30,000 miles of travelling. And not only has this been possible, but in Shan-si, in Sze-chuen, and Kwei-chow, mission stations have been opened at which missionaries are labouring, and in the first of these ladies are now residing.

It was satisfactory to see to what a great extent the spirit of the Chi-fu Convention had been loyally carried out by the Chinese officials; and we can only trust that all the clauses of that Convention may be fully ratified, so that, a thoroughly good understanding being established between the Chinese Government and our own, it may soon cease to be a matter for wonder that an Englishman should pass through the length and breadth of China without molestation.

On the conclusion of the Paper:—

The CHAIRMAN (Sir Rutherford Alcock) said the Society was favoured that evening with the presence of the Chinese Minister, who had come both to have the pleasure of seeing what the Society was, and of hearing the Paper read by Mr. McCarthy, on a walk infinitely more productive and more fruitful than many of the walks that Englishmen had been accustomed to lately, of a thousand miles in a thousand hours. He had travelled more than two thousand miles on foot from Hankow to Bhaino, and had made interesting geographical and ethnological observations in the course of his journey. One thing must be especially gratifying to everyone in this country, and to His Excellency also, namely, that throughout the whole of that long journey, extending over eight months, Mr. McCarthy did not meet with a single act of incivility, was never asked for his passport, and was never refused any assistance or courtesy that he desired. It was therefore to be hoped that the journey would be a fitting introduction to a new state of relations with the vast empire of China, and that the two countries would thus come to understand each other better, and that at no distant time Englishmen would be able to pass as freely from one end of China to the other as through Europe. Mr. McCarthy's success had been in great measure due to his having travelled in the native costume, and to his ability to converse with the people in their own language. In such cases China was now as free to Europeans as Europe to the Chinese or to any other nation. Although he did not suppose that His Excellency had been able to follow the whole of the account, he trusted that he had gathered sufficient from it to show him that nothing was more desired in this country than to establish the most friendly and beneficial relations between the two countries.

His Excellency the CHINESE MINISTER (the Marquis Tsêng) addressed the Meeting

in Chinese, his remarks being interpreted by Dr. Macartney as follows:—His Excellency had expressed his regret that he had not been able to follow Mr. McCarthy throughout the whole of his address, but that portion of it which he did understand afforded him very great pleasure, and no part of it gave him so much gratification as to hear of the manner in which Mr. McCarthy had been treated throughout the great walk that he had made from the east to the west of China. Mr. McCarthy had testified to having received nothing but civility and great courtesy and hospitality, and that afforded His Excellency great gratification. He hoped that such might be the experience of every succeeding traveller who visited his country. It was only by frequent visits to each other's countries that the Chinese and the English could come to a knowledge of the good points in each other's characters.

Mr. WINCHESTER said it was a source of great satisfaction to everyone who (like himself) had served in China, to find that the relations between that country and England had improved and become softened. He himself had never had the opportunity of visiting the remoter parts of China, but his experience confirmed what Mr. McCarthy had said, namely, that if the people were conciliated, it was quite possible to travel among them with comfort, and even to receive attention and civility. Nothing could be more likely to extend the trade and commerce of this country with China, than for travellers into the interior of the latter country to act upon the principle of giving and receiving good offices. He could quite confirm what the reader of the Paper had said, that there was no country more interesting than China. Its vastness, the immense amount of the population and of commerce by roads, rivers, and canals, was something that must strike everyone with astonishment. When they contemplated the great works which the Chinese had elaborated, such as the Great Wall, and the wonderful causeway roads which passed over the highest mountains and around precipices that it seemed impossible to approach, they could not but admire the extreme industry of the people.

The CHAIRMAN could assure the Meeting from some personal experience of travel through parts of China, that Englishmen in general had very little idea of the magnificence of the scenery and of the perfection of many of the roads in China, which, even in Europe, would be considered admirably adapted for artillery and military service. The movement of the immense population of three or four hundred millions was certainly something to impress a traveller with a strong conviction that he was looking upon an amount of civilisation, industrial and otherwise, such as Europeans scarcely had an idea of, and which probably few countries in Europe surpassed. Mr. McCarthy had not been along the most frequented roads which were the great network of communication between the Yang-tsze-Kiang and the Yellow River, and the great canal over the vast plains of the Yang-tsze-Kiang, where travellers would be most struck by the eternal movement of life, vitality, and industry, and where the people were well fed and well clothed, although their chief food was rice, and their chief drink tea of a very weak kind, for they preferred it so. When they did not smoke more noxious materials—and, after all, he believed only a small portion of the population as yet used opium—they smoked a very weak and fragrant tobacco. Upon that diet they would do work and show endurance that our best navvies could hardly rival. That should be some encouragement to teetotallers and vegetarians when they found that it was possible to maintain a great amount of physical health, comfort, strength, and endurance upon a very different diet from that which was deemed so essential in England. On the other hand, it must make some people's mouths water when they heard of a country in which, instead of paying 1s. or 1s. 6d. a pound for meat, it could be bought at 2d. a pound, and fresh eggs at five a penny, though, as far as his own experience went, fresh eggs were not very common, for the

people rather preferred eggs that had been kept. Notwithstanding that the people had suffered as frightful, if not a more frightful, famine than any that had happened in India of late years, that they had gone through two or three most terrible insurrections that had swept like a simoon or an earthquake over whole provinces and devastated them, yet there was such an astounding power of vitality in this industrious race that they had sprung up again, and in a few years covered the ground with fertility and produce of every kind. He believed that China, which had endured so much and yet had prospered for certainly some 2000 years, had still a great future before it. It was true that it had not adapted itself very readily to the innovations which modern civilisation would introduce, but Galileo's words might nevertheless be applied to them—"E pur si muove"—it did move, and was moving. Although the people did work their coal mines in a very miserable and insufficient way, digging out the veins in what was technically called adits by horizontal levels, the country possessed what would no doubt be a source of future power and wealth—ironstone and coal lying in close proximity over large fields. That had been the element of England's national development and power; but it was possessed in quadruple extent by China, where there were coalfields extending over thousands of square miles, and ironstone everywhere. He thought the time was coming when China would, with the help of European machinery, and with all the resources that European civilisation could give it, develop her coal and iron industry. The Chinese Government was not at all unaware of the resources which the country possessed.

Notes on Matabeli-land. By (the late) Captain R. R. PATTERSON.*

I ARRIVED at Gubuluwayo, the capital of the Matabeli, on the 27th August, 1878.

Matabeli-land is at present governed by the king Lobengule. It is bounded on the north by the Zambesi, on the south by the Sasha, on the east by the Sabia, and on the west by the Zonga rivers; forming an irregular square, of which each side measures about 400 miles. The country is rich in natural resources. The soil is good; it is well watered, has a fine climate, and trees of great variety and size. The mapene, mimosa, and baobab are of great size. The breadfruit-tree, palms, cotton, olive and all kinds of wild fruit-trees also flourish, and there are immense forests of large trees. The Mashona and Tati districts are reported to contain gold in considerable quantities; iron also is plentiful.

A range of mountain flats commences in the Mashona country, runs south-west, breaks up and ends in thousands of kopjes formed of huge blocks of granite piled up most fantastically, and is well watered. In this part of the country are fastnesses from which it would be difficult to dislodge fairly armed and determined occupants. The two days by

* Being the rough draft of a report, in Captain Patterson's handwriting, found among his papers on the return of his waggou to Pretoria, after his death, and communicated by the Colonial Office. An account of his death is given by Sir Henry Barkly, *ante*, p. 243.

waggon, occupied in crossing this belt, gave an ever-changing panorama, with magnificent scenery.

The population is estimated at 200,000, composed of three classes:—

1. The Abazanzi, who are the aristocracy, descended from the original Zulus who invaded the country under Masilikatzé; these amount, say, to one-fourth.
2. The Abentla, who are of Bechuana race, taken prisoners by Masilikatzé on his way from the south-east, but who are now incorporated in the nation; say one-fourth.
3. The Amacholi, composed of various tribes, the original inhabitants, now the servants of the Abazanzi; say one-half.

The number of fighting men is 15,000.

The people are spread evenly over the country, in small towns created from time to time by the king, who assembles near him the young men, forms them into regiments, drills them for four years, and then gives each regiment a location where to settle.

The people own cattle, sheep, and goats in limited numbers. The women till the land, and with little labour produce splendid and sure crops. The men labour but little, their occupation being eminently warlike; regiment after regiment is periodically launched at their neighbours, and they make war in the most savage and ruthless manner, sparing only the children, whom they carry off as slaves, burn the towns, and drive away the cattle. One hears tale after tale of torture and cruelty. As I make this note, a string of prisoners is being brought to the king, and I see the children tied neck to neck in file; one woman and her baby, for some unusual reason, are of the party, babies being generally dashed to pieces for amusement, and as being too young for any useful purpose.

But this is nothing more than what could be expected from a people belonging to the fierce Zulu race, brought hither by the late king Masilikatzé, and who now occupy a country rudely wrested from others. Nothing from childhood upwards but a life of bloodshed and blows, and religious rites of the most cruel kind.

Death is inflicted for the slightest offence, and a cruel people being governed with a rod of iron, they become more and more cruel. The king, in telling me of his difficulties in securing the friendship of white people, said: "You know we have only one punishment, and you white people object to that."

To become Christians, to amass property, indeed to improve in any way, is highly dangerous in Matabeli-land.

The government of the country is almost personal: over each town is appointed an Induna, who reports the most trifling occurrences direct to the king; sometimes light cases are tried by the Indunas, but all verdicts require his sanction. Anyone incurring his grave displeasure by change of habit of life, amassing property, or anything approaching rivalry, is murdered in the most simple and open manner by the body-guard acting under his orders. This is of constant occurrence; one

example may suffice. Umtagan, a great Induna of Kutwayo, whose only crime was supposed sympathy with Kuruman, obeying the king's summons, was, without warning, killed on the road by the messengers.

Gubuluwayo, the capital, is situated near the centre of the kingdom, on the crown of a circular hill. The king's residence near the centre is a house built on the model of the white people's; the huts are the usual circular Zulu hut. The houses of the white traders are spread about at considerable intervals outside the town.

Gubuluwayo is only occasionally occupied by Lobengule; he passes a great portion of the year in temporary towns, built where fancy may direct.

The king is a son of Masilikatzé, and is about thirty-eight years of age; he is a large heavy man, with a powerful though sensual face. Nearly naked, with his rifle in one hand and assegai in the other, he looks the impersonation of dignified savagedom; but when he likes, he can assume a pleasant, even fascinating manner. As a young man, and for some time after he became king, he associated much with white people and adopted their dress. He built for himself a house, welcomed them to the country, and ensured their safety. Of late a change has come over him. With the return to a garb of a few strips of monkey-skin, he appears to have resumed an analogous condition of mind, rejects all improvements, restricts trade, discountenances missionaries, and does not defend white men from attack and insult. Whether this change is one of real feeling, or is a political design, is difficult to say. Surrounded by men still greater haters of civilisation than himself, he is a man of whom we can have little hope. Prophet, priest, and king for evil, he is omnipotent; all property centres in him.

The relations of Lobengule with other tribes are most unsatisfactory. Before arriving in this country, Masilikatzé conquered the Bechuana. The Matabeli have ever since claimed the large tract of country on their western frontier extending even to Lake Ngami, disputing its possession with Khame; four years ago one of their armies overran it. They hold the Bamangwato in great contempt. Their eastern boundary is constantly pushed further by warlike inroads. The Mashona can offer no resistance; it is only the Banyaié, a south-eastern tribe, occupants of the Mashona Mountains, who have as yet been able to hold their own. Umzila and Olangapooma, Zulu chiefs, east of the River Sabi, alone would be able to oppose any attack, perhaps successfully. The Matabeli do not attempt to cross the Zambesi.

Trade is conducted on two systems, one by means of stores at Gubuluwayo, and the other by waggons travelling with the king as the chief customer, or visiting hunters in the veld and the various towns scattered over the country. Complaints made by traders and travellers, to the British Government, of the Matabeli attacks, robbery, and insults, I find are very general; but the residents at Gubuluwayo have not participated

in the movement to make them known; this, I think, arises not so much from better treatment as from fear of bad results to their trade; indeed it is asserted that the king has much restricted his trade operations in consequence of the recent complaints.

The law here is that no stranger can travel or hunt without the king's permission and the payment of a tax, variable at his discretion; still it is a fact that expeditions having complied with these rules, have been attacked and plundered. The king's version is that when he hears of people going into his veld without his permission, he sends out a regiment to bring them to him, and, in doing so, that they have occasionally exceeded their orders. They, on the other hand, have been known to say that although the king had given them written credentials to that effect, still they were obeying his last and real word. It is almost impossible to arrive at the truth, especially when one remembers that the property of the king himself does not escape. The instruments he employs are such arrant thieves and scoundrels, that they avail themselves of every excuse to rob and plunder. Such is their dislike to white people, that I do not consider either lives or goods secure.

The Mashona country is inhabited by a peaceful industrious people, skilful in the working of iron, makers of baskets of artistic shape, and growers of cotton which they weave into serviceable cloth. The country is said to be very fruitful, splendidly watered, and with large plateaux of open flats; similar, in fact, to the country of the Orange Free State.

GEOGRAPHICAL NOTES.

Projected Journey of M. Soleillet in West Africa.—M. Paul Soleillet, who recently returned to France from Senegal after a determined but unsuccessful attempt to penetrate, via Timbuktu, into Algeria, will start on a fresh expedition in December next. This second journey will be undertaken under the patronage of the Senegal Government, who recently voted a sum of 800*l.* to M. Soleillet to enable him to return home for the benefit of his health, and to procure the necessary outfit for his fresh expedition. On his last journey M. Soleillet reached Ségou, but was forced to return from that place. On the next occasion he intends to make another attempt to pass by way of Ségou, and if turned back, he proposes to try again and again until he succeeds. He is especially anxious to examine the little-known country between In-Çalah and Timbuktu, in connection, it is said, with the Trans-Sahara railway project.

Belgian International Expedition to the Congo.—Owing to the difficulties of transport from the east coast of Africa into the interior, the International African Association are about to make an attempt to forward supplies by way of the Congo. They have accordingly fitted

out at Antwerp the Belgian steamer *Barga*, of 829 tons, and have despatched her to the mouth of the Congo with a full cargo, in which are included materials for houses, wooden huts, tents, provisions, arms, and general merchandise. When loaded, the *Barga* draws 14 feet, and will consequently not be able to ascend the Congo; in order, therefore, to convey her cargo to some point where it can be reached by the Belgian explorers, who by last accounts were making their way towards Muata Yanvo's, she takes out in pieces three undecked steam-launches, a small steamer with two cabins that will accommodate thirty persons, and three large flat-bottomed boats of 50 tons each. The draught of none of these boats will exceed 16 inches, and they will be able to ascend the Congo for a long distance in the rainy season. By their means it will also be possible to form permanent or temporary stations on the banks of the river. The flotilla is commanded by Captain Loesewitz, who has under his orders forty picked sailors, among whom are men of all trades likely to be of service. In connection with this subject, the editor of 'Les Missions Catholiques' has received a letter, dated Landana, May 2, from Père Carrie, Superior of the Congo Mission, who mentions the expected arrival on the Congo of an expedition, for the interior, of a scientific, industrial, and commercial nature, in which Mr. H. M. Stanley is to take a leading part. He adds that that traveller was expected at Banana (at the mouth of the Congo) from Zanzibar towards the end of June or early in July, and that large premises were in course of construction at that place. We may infer with some degree of probability that we have here the explanation of Mr. Stanley's secret preparations at Zanzibar, which recently excited so much curiosity there, and that he will eventually join Captain Loesewitz's expedition.

The Algerian Missionary Society's Expeditions to the Lake District of Equatorial Africa.—In continuation of the note in the July number, we learn that Mgr. Lavigerie, Archbishop of Algiers, has at length received definite intelligence of the arrival of the Nyanza portion of the Expedition. In a letter, dated February 18, Père Livinhac, its leader, refers to a previous letter which has apparently miscarried, and states that his party reached Akaduma, or Kaduma, on the south-west of Lake Victoria, in the early part of January. They intend to remain there while two of their number visit King Mtesa, and ascertain whether they had better remain where they are, or establish themselves in some other part of his kingdom. The messengers started by water on January 20, and were expected to return about the middle of March. Though not much is said on the subject, and no details are given, the Expedition appears to have met with serious difficulties after leaving Unyanyembe, for Père Livinhac states that, notwithstanding their obtaining 2000*l.* through Arab traders at Tabora, they are again reduced to great extremities, and he expresses a fear that, unless further supplies are at once sent from the coast, they will all die of hunger. Père

Livinhac complains that everything is excessively dear, owing "to the prodigality of Protestant missionaries and English explorers."—The reinforcements for the Nyanza and Tanganyika missions left Algiers for Zanzibar on June 29. They consist of twelve missionaries and six ex-pontifical Zouaves, the latter selected from a large number of applicants.

M. de Brazza.—At a meeting held on June 22nd, the Italian Geographical Society awarded a gold medal to M. Savorgnan de Brazza, the leader of the French Ogowé Expedition, for his recent explorations in Western Equatorial Africa, of which a brief account was given in the 'Proceedings' for February, p. 129. M. de Brazza is said to have determined to undertake another journey of discovery in Africa.

Major Tanner's Exploratory Visit to Kafiristan.—Major Tanner, of the Indian Survey, who accompanied Sir Samuel Browne's column in the recent Afghanistan campaign, has undertaken, since the conclusion of the war, an exploratory journey of adventurous and perilous character into the mountain home of the Sia-posh Kafirs, north of Jalalabad. Letters have been received from him since his arrival at *Arét*, in the hills. He left Mir Ahmed Khan's fort in the evening of the 17th of May, with four *Chugunis* and three of his own men; the Mullick Azim Khan, son of Mir Ahmed Khan, accompanying him part of the way. The journey was beset with danger from the commencement, being through country inhabited by enemies of Major Tanner's guides, and the march had to be made in the night. Thus the party got safely past Budiali, and reached the friendly village of Shulut. From Shulut they ascended to 7300 feet, and enjoyed the magnificent prospect:—Kund and its spurs and valleys to the north, with the village of *Arét*, belonging to Azim Khan, 2000 feet below them; on the north-east a broken ridge running down on the horizon from Kund to the Kunar, and bounding the valley in this direction; and to the east and south the Kunar and Mazar Durra, backed by the peaked hills that separate the Mohmunds from the Kunar people; Jalalabad looked hot and dusty, and beyond it the Safid-Koh loomed faint in the distance. The hills up which they had climbed were clothed in trees, including all kinds of garden trees growing wild, and on the ground in shady places were strawberries and many ferns. Birds were plentiful, and their cries and notes resounded all around. The upper limit of fir-trees is just 7000 feet, as on the Safid-Koh. *Arét*, where Major Tanner was then staying, is a very large village on a steep slope, surrounded by terraces, made with great labour. Five or six hundred feet below it, a noisy mountain stream rushes down in its descent from Kund. The houses number many hundreds. The villagers possess cows, sheep, and goats, of very small breeds. Major Tanner corroborates former accounts as to the position of women among the Kafirs. He says they mix freely with the men and talked to the people of his party,

asking the news. He saw one child playing with a doll in a doll's cradle, which, he says, reminded him of childhood in his own country.

Latitudes and Longitudes of Positions on the Lower Oxus.—The Russian Geographical Society has recently published a report by Dorandt on his astronomical and magnetic observations on the Lower Oxus. His instruments were: a theodolite, six chronometers, a prismatic compass, and an artificial horizon of a new construction, by Gerbst of Pulkovo, with cover fitted with talc panes. Observations for time were taken by equal altitudes, six before and six after the meridian passage. The corrected mean local time for the camp at Nukus was found to be 2 hrs. 24 min. 52.65 sec., and its longitude east of Greenwich 3 hrs. 58 min. 3 sec.; that of the other stations being obtained by time differences with Nukus which served as the base. In order to ensure accuracy, the journeys were, whenever possible, made by water, and the chronometers were transported in a largo boat or kayuk, such as would ride steadily in rough water; care too was taken to protect them from the direct action of the solar rays by means of a temporary screen of plaited reeds. After each set of observations the observer returned as speedily as possible to Nukus. Of the nine positions fixed, five were in the delta itself, viz. Chimbai, Kungrad, Kushkana-tau, Ak-kala and Klytch-kala, one, Nukus, just above it, and the remaining three, Khiva, Hodjeili, and Petro-Alexandrofsk higher up the river. In every case the exact spot where the observations were made is fully described, so that future observers may find it: thus at Petro-Alexandrofsk, in August and September 1874, the observations were made in the meteorological station, a building of unbaked bricks, close to the northern wall of the fort and between the barbettes. Almost exactly in the same meridian is a fine avenue of poplars leading to a pond or tank shaded with willows. Beyond this stands the house formerly owned by Mat-Niaz, cousin of the Khan of Khiva, and now occupied by the Russian commander of the district; next comes a spacious courtyard, and beyond this a second tank much larger than the first. It was at this spot that observations for time were taken in May 1875. Petro-Alexandrofsk is the only place where the difference of time as compared with Nukus was taken twice, the mean of the two sets of observations giving the longitude of Petro-Alexandrofsk 5 min. 44 sec. east of the observatory at Nukus. The absolute longitude of Nukus was further determined by observations of the solar eclipse on the 10th October, 1874 (visible, it may be remembered, in London), and of the passage of Venus across the sun's disc on the 9th November of the same year. These observations were taken with a theodolite, the objective glass of the telescope having a diameter of only three-quarters of an inch, and a magnifying power of 12. They resulted in a meridian of 3 hrs. 57 min. 9 sec. east of Greenwich. But the more correct longitude of Nukus (as given above) was determined by computations for time from Kungrad, the position of this place having been fixed by M. Solimani

in 1873 by occultations of stars and time differences.—The latitudes were all found by meridian altitudes of the sun, allowance being made for index error, refraction, and parallax. The mean of three sets of observations gave

	Latitude North.			Longitude East of Nukus.			Remarks.
	°	'	"	hrs.	min.	sec.	
Nukus	42	27	24	..	..	..	Observatory garden; 350 feet from north face of fort.
Petro-Alexandrofsk	41	28	12	0	5	44	Meteorological station.
Khiva	41	22	37	0	3	4.5	Khan's garden of Sirt-cheleh.
Hodjeili	42	25	31	0	0	26.8	Open square east of Murtazali Bey's garden.
Kungrad	43	4	27	0	2	41.6	Courtyard of Hanki-aul, where the Khan lodges on his visits to Kungrad.
Kushkana-tau	43	7	22	0	0	50.4	Between eastern spur of hills and large lake forming part of the delta.
Chimbai	42	56	15	0	0	46.8	Market-place south-east of town.
Klytch-kala	43	0	32	1	3	19.2	Landing-place for boats (kayuks).
Kazalinsk on Jaxartes	45	45	22	0	10	18.5	Esplanade west of fort.
Irghez	48	37	37	..	..	..	North-west of fort, 310 paces from church.

Tables of all the observations, including those for magnetic declination, will be found in the valuable report of M. Dorandt.

Threatened Destruction of Forest in the North-West Provinces of India; its Causes and Consequences.—Mr. G. Greig, Conservator of Forests, contributes to the last number of the 'Indian Forester' a paper on the Bánda forests and their present condition. These forests, which contain a considerable variety of trees and shrubs, are situated on low rocky hills of a peculiar type; the top a plateau (*pátha*), the sides precipitous walls of rock (*ári*), from 50 to 300 feet high, and then a more or less gradual slope to the valleys. The plateaux are, as a rule, fairly level, but some are undulating and on some are distinct little hills; most of them are totally uncultivated, but on a few there are some small, poor villages. These plateaux are generally fairly well covered with dhawa (*Anogeissus latifolia*), shéj (*Lagerströmia parviflora*), sandan or tinsa (*Ougeinia dalbergioides*), khair (*Acacia catechu*), the wood of which yields catechu, saj (*Terminalia tomentosa*), tendu or ebony (*Diospyros melanoxylon*), the fruit of which is much eaten, achar (*Buchanania latifolia*), salie (*Boswellia thurifera*), &c., and from many of the trees excellent timber is obtainable. The precipices flanking the plateaux are very extraordinary and picturesque; the huge blocks of rocks, piled one above the other in all sorts of grotesque shapes and positions, give them the appearance of enormous masonry fortifications in ruins. Various kinds of ficus grow along the tops of the *ári*, their roots shooting through crevices of the rocks and hanging down the face of the precipices like so many ropes. The base of the *ári*, being cool and moist, is generally well clothed with

fine trees and a few bamboos, with here and there dense thickets of large-leaved creepers, climbing over huge masses of fallen rock and forming quiet retreats for a few sambar and an occasional tiger. The slopes are almost invariably successions of terraces and slopes sparsely covered with inferior forests; lower down in the basins the forest improves, and the valleys are generally well covered with all the most useful kinds of timber trees.—Of late years great devastation has been committed in these forests. Some thirteen or fourteen years ago an enormous amount of wood was used in the construction of the railway from Allahabad to Jubbulpore; large quantities are taken for brick-burning, &c., but the annual fires do the most damage. Under such circumstances Mr. Greig remarks that it is not surprising that the forests deteriorate; by the end of summer all leaves and other vegetable matters have been burnt, and the ground left perfectly bare and hard. The monsoon breaks with a heavy downpour, and it takes many days to soften the ground sufficiently to allow the rain to soak in as fast as it falls, and meanwhile the water is rushing off the hills in torrents, and carrying with it immense quantities of surface soil to the rivers below. In order to prevent the denudation of these hills, in Mr. Greig's opinion, the jungle fires must first be stopped. If this be done for the next fifteen years, the whole aspect of the country would be totally changed; the trees and grass would remain green until well on into summer; a thick coating of vegetable mould would be formed, which would keep the ground cool and moist; the rain would then percolate through the soil, instead of rushing off in torrents and carrying soil with it; the temperature of the neighbourhood would be lowered, and dry watercourses would become running streams.

Mr. Hillier's Journey in North China.—At the beginning of the present year Mr. W. C. Hillier, of H.M.'s Consular Service, visited the province of Shansi, in order to obtain by personal inspection some idea of the actual condition of the famine-stricken districts, and, though the greater part of his very full report is naturally occupied with other subjects, it contains some very interesting geographical details regarding an extensive tract of country. On his arrival at Hankow from Shanghai he was joined by Mr. S. Drakc, of the China Inland Mission, who was on his way to Pingyang-fu, in Shansi. They left Hankow on January 18th on wheelbarrows, the only vehicles for land travel procurable in the province of Hupei. The object of the travellers being to get northwards as fast as possible, they took the most direct road through Hupei, which was to a certain extent a new one, and which avoided the larger towns and ran chiefly through a wild and deserted country. On the second day they left the alluvial plain of Hankow, and rose by a gradual ascent to higher ground. On January 25th they entered Honan by a rocky pass, some 500 feet high, and in two days reached Sinyang-fu, where carts are usually obtainable. Being only able, however, to procure one of these vehicles, they were obliged to take some of

their barrows to Chioshan-hsien, three days' journey further on. After leaving Hsüchow, the next town, the absence of timber was very marked, and a general air of desolation prevailed; in some places, however, Mr. Hillier says they could hardly judge of the nature or condition of the country, for the road lay for many miles through deep cuttings of *loess*, just wide enough for the cart to pass, perpendicular walls of this strange formation towering for hundreds of feet above their heads. On emerging from this belt of *loess*, they found themselves on a sandy plain, which continued as far as the Yellow River. Crossing this on February 8th, they travelled in a westerly direction to Wuchih, near which town runs the River Chin, at times a source of great danger to the neighbourhood. The expanse of uncultivated land on either side of this seemingly harmless stream shows the width it is able to assume, and the enormous banks that have been erected at some points to check its course, give evidence of its volume and intensity at certain periods of the year. At Hwaiching-fu, the frontier city of south-western Honan, the party engaged pack-mules, and a ride of about 9 miles brought them to the foot of the mountains that divide Honan from Shansi. After a steady ascent of 12 or 13 miles they reached a little mountain village some 2500 feet above the level of the plain. The traffic along this mountain road Mr. Hillier describes as something stupendous, and he says they met fully two thousand people in the course of a single afternoon. Strings of mules, camels, men and boys came trooping down laden with coal, iron pots, pans, and bars, limestone, and so forth, while hundreds of coolies were toiling up the pass, staggering under packages of brick tea. The mountainous region through which the party next passed was in a most terrible condition from famine, and Mr. Hillier's narrative furnishes ample proofs of the heartrending scenes he witnessed. He and his companion reached Pingyang-fu, 600 miles distant from Hankow, on February 18th. After studying the method of relief adopted by the foreign missionary agents, to whom he brought welcome pecuniary aid from Shanghai, Mr. Hillier left Pingyang alone on February 25th, travelling in a northerly direction, and on his arriving at Hwailu, the frontier town of Chihli, at the foot of the terrible Ku-kwan Pass, he found that he had left the famine district behind.—Of the rest of his journey through north-eastern China he says nothing, but with regrettable diffidence refers the reader to Williamson's description of the route from Pingyang to Tientsin. There are two points, however, towards the conclusion of his report which are worthy of consideration, as bearing on the general character of the country traversed. From the well-known scarcity of trees in many parts of China, the famine has been attributed in a great measure to the effects of disafforestation. Want of timber may, of course, have been one of the many causes, but Mr. Hillier remarks that in some places, especially in Honan, there was much more timber than he expected to see. The

villages and towns were well stocked with trees, which in many places were so thickly planted as to form, even in winter, a prominent feature in the landscape. In Shansi they were not so numerous, but Mr. Hillier noticed the existence of a superstition which would tend greatly to assist in the preservation of timber wherever it existed. Numbers of old trees were covered with inscriptions, either cut on wooden boards or written on slips of paper, containing the well-known Chinese saying, *Yu-chiu pi-ying* (Ask and you shall surely receive). Trees are apparently in that region supposed to possess divine powers, and there was hardly a village through which the party passed that did not contain at least one of these sacred trees covered with the offerings of grateful devotees. The mountains are almost devoid of timber, but it is possible, Mr. Hillier thinks, that this may be due to the peculiarity of the soil or other natural causes, for the same fact is noticeable in the Mongolian plateau, though the rainfall is by no means deficient in that region. As regards means of communication, the roads, especially in the mountains, are as bad as they possibly can be. The only entrance into Shansi from the north is the Ku-kwan Pass, and Mr. Hillier says he has seen nothing anywhere to equal it for roughness. The time usually allowed for the passage by mules is five days, and for carts seven; in some places eight mules are harnessed to one cart, and even then it takes the united efforts of the whole team, stimulated by the shouts of a dozen men, who are pushing from behind or pulling the wheels round, to get it over some of the difficult parts. From the south there are two roads into Shansi, one the pass by which Mr. Hillier and his companion travelled, which is so difficult that no grain enters by it, and the other by way of Honan-fu. On this latter road the grain traffic is so large that serious blocks often occur, as in some of the deep cuttings of the *loess* there is not room for two carts to pass.

The American Polar Expedition via Behring Strait.—The Bennett Expedition to the Arctic Regions, in the *Jeanette*, left St. Francisco for the polar sea on the 8th of July, amid demonstrations of lively interest on the part of the citizens. The Expedition is claimed to be the first which has set out with the aim of pushing forward towards the Pole by way of Behring Strait. The plans of the leaders were kept secret to the last; even a meeting and discussion on Arctic subjects at the California Academy of Sciences, to which the officers were invited a few days before their departure, failing to elicit any information of importance. Although a private Expedition in so far as its cost is defrayed by the public-spirited citizen of the United States to whom its origin is also due, it has been made, by special Acts of Congress, a public and national one as regards its organisation. The vessel is manned by officers of the United States Navy, and is allowed all the rights and privileges of a Government ship; the voyage therefore will be carried out with all the advantages which naval discipline gives to such

enterprises. The commanding officer is Lieutenant De Long, U.S.N., who has had previous Arctic experience, having been up Baffin Bay in the *Tigress* when that vessel was despatched by the American Government in 1873 in search of the *Polaris*. Several of the subordinate officers and some of the crew—all carefully-picked men—are also old Arctic voyagers. The scientific staff consists of Mr. J. J. Collins, as meteorologist; Mr. R. L. Newcomb, as astronomer; and Mr. Brooks, from the Smithsonian Institution, as naturalist. A tender accompanies the *Jeanette* as far as St. Michaels with coal and provisions, wherewith to replenish the exploring vessel just before entering the field of its work.

Danish Exploration in Greenland.—News has reached Copenhagen of the arrival at Holsteinborg, on April 30, of the Danish Expedition, to which allusion was made in the May number (p. 331). Lieutenants Jensen and Hammer, accompanied by M. Komerup as geologist, started again on May 15 to explore the coast-line between the colonies of Holsteinborg and Egedesminde, their work being preliminary to a more important expedition which it is in contemplation to despatch next year. The winter at Holsteinborg is reported to have been a remarkably mild one, and the ice had entirely disappeared on May 15.

Distribution of Rainfall in New South Wales, and its Cartographical Representation.—As he considers it very difficult to see general results from a glance over a mass of figures which form the Rain Table for 1878, Mr. H. C. Russell, the Government Astronomer for New South Wales, has added a map on which the position of each station is marked by a conspicuous black spot, and to show the relative rainfall in various parts of the colony, the diameters of these black spots have been made in proportion to the amount of rainfall. These spots indicate very clearly the gradual decrease of rain going west, and show, at the same time, places which, like Orange, are subject to local peculiarities that affect the amount of rain. At Orange and Cordeaux River a greater rainfall than on the plain country might have been expected from the positions among the hills and on high land. Bodalla also is so situated with regard to the high land as would lead to the expectation of a large rainfall; but with regard to Narrabri and Port Macquarie the situations do not seem to account for the exceptional rainfall. The last-named place, however, appears to have been always remarkable for the amount of rain which falls there. Mr. Russell concludes his brief remarks by observing that “there are many blank spaces on the map which he trusts may be filled by those living in the districts, and willing to help him in collecting information of so much value both to the occupier of land and the scientist.”

International Congress of Commercial Geography.—At the former meeting of this Congress at Paris last September, it was resolved, on the proposition of the Portuguese delegates, that the next session

should be held at Brussels during the present year, and the Belgian Geographical Society has been requested to make the necessary arrangements. With the view of preserving the international and cosmopolitan character of the Congress, and of giving it at the same time some national elements, so as to ensure durable results both for Belgium and for foreign countries, the Society invited the Geographical Society of Antwerp and the chief commercial and industrial associations of the country to join it in forming a Committee of Organisation, of which the President is M. J. C. Houzeau, Director of the Royal Observatory and President of the first-named Society. The Committee have issued an earnest appeal to all who are interested in the subject, inviting their aid and presence at the Congress, in order to ensure its success.

The work of the Congress, which is to last five days (September 27 to October 1), will, as on the former occasion, be conducted in five sections. The following is the programme for discussion in each:—

I. **EXPLORATIONS ET VOIES COMMERCIALES.**—Explorations commerciales récentes; leurs résultats. Explorations commerciales à provoquer pour ouvrir de nouveaux débouchés au commerce et à l'industrie. Programmes et questionnaires à proposer aux voyageurs, aux capitaines de navires, aux Consuls. Nouvelles routes terrestres, maritimes, fluviales, à suivre ou à ouvrir au commerce. Choix d'un méridien initial. Installations maritimes et outillages des ports. Mesures officielles et d'initiative privée à prendre pour augmenter le trafic et étendre les relations de la Belgique à l'étranger. Vœux à adresser aux gouvernements.

II. **PRODUITS NATURELS ET MANUFACTURÉS.**—Produits végétaux, minéraux et animaux à exporter des diverses parties du globe; marchandises à y importer en échange. Musées de Géographie Commerciale créés ou à créer. Règlements internationaux pour l'échange des productions intellectuelles. Procédés industriels des pays lointains et en particulier de l'extrême Orient. Questionnaires à soumettre aux Consuls et aux commerçants résidant à l'étranger. Vœux à adresser aux gouvernements.

III. **ÉMIGRATION ET COLONISATION.**—Causes générales de l'émigration. Diverses systèmes de colonisation; exemples à suivre. Développement des entreprises commerciales. Comptoirs à l'étranger. Conditions dans lesquelles doit être entreprise une exploration commerciale. Acclimatement des colons. Avantages offerts à l'immigration par différents gouvernements. De la colonisation au point de vue Belge. Vœux à adresser aux gouvernements.

IV. **ENSEIGNEMENT.**—Diffusion de la géographie commerciale; livres, publications périodiques, cours, conférences, voyages d'études. Notions de géographie commerciale à introduire à tous les degrés; primaire, secondaire, supérieur et spécial. Vœux à adresser aux gouvernements à introduire la géographie commerciale dans les concours officiels.

V. **QUESTIONS GÉNÉRALES.**—Organisation des corps Consulaires. Organisation des Chambres de Commerce. Relations des sociétés de géographie commerciale entre elles et avec les sociétés scientifiques et économiques. Moyens d'associer les intérêts commerciaux et scientifiques; services réciproques que peuvent se rendre le commerce et la science. Traités de commerce et libre-échange.

Dominica and its Boiling Lake.—Writing from Dominica on the 27th of last June, to the 'Colonies and India,' Dr. H. A. Alford Nicholls makes some interesting remarks on the physical features and capa-

bilities of this island, which is but little known, though with the exception of Jamaica and Trinidad, it is the largest of the British West Indian islands. Owing to its volcanic origin it is mountainous, but in many parts fine undulating uplands extend from the heads of the valleys far into the interior. One of these plateaux, called the Layon Flats, about 800 feet above the level of the sea, stretches across the broadest part of the island, and contains many thousand acres of fine, well-watered land, covered with a virgin forest of lofty timber trees. The highest mountain peak attains an elevation of 4747 feet, and is named "Imray's View" in the last Admiralty chart, from the fact that it was first ascended by Dr. Imray in 1862. Dr. Nicholls has paid three visits to the celebrated Boiling Lake, of which he thought that he and his companions were the discoverers, but he has since found that the volcano is mentioned in a rare medical work, published in 1797 by Dr. Clarke. On one of these occasions Dr. Nicholls was accompanied by Mr. H. Preston, whose account of the journey was communicated to the Society by the Colonial Office, and published among the Additional Notices in the 'Proceedings' (vol. xx. p. 230). On his second expedition Dr. Nicholls ascertained by an aneroid barometer that the height of the lake above the sea was 2425 feet; the temperature at the margin was 108° F., and a few feet out it increased 4°. As regards the agriculture of the island, Dr. Nicholls remarks that like most volcanic soils that of Dominica is for the most part exceedingly fertile, and the fruits and vegetables are celebrated throughout the Antilles. Coffee was formerly the chief product of the island, but about forty years ago nearly all the coffee-planters were ruined by the ravages of the white-fly blight (*Cemistoma coffeellum*), and it is only now that attention is being again turned to its cultivation. The Liberian variety, for the introduction of which Dominica is indebted to Sir Joseph Hooker and Dr. Imray, may now be said to be naturalised in the island, and it is unaffected by the blight, which still attacks what is called the "native coffee." Dr. Nicholls, in conclusion, expresses an opinion that amid the primæval forest, which covers the greater part of the island, there are many thousands of acres available for the cultivation of coffee, cocoa, spices, limes, and other tropical products.

Dr. Crevaux, whose remarkable journeys in Guiana were noticed in former numbers of the 'Proceedings' (pp. 131, 280), has deferred his return to France for the present, proposing to extend his explorations westward. He writes from Iquatiára, on the Amazons, under date of April 10, to Signor Guido Cora, stating that he is desirous of reaching the Andes by a new route, the River Iça or Putumayo, one of the great tributaries of the Upper Amazons. He thinks that there is much to be done in that part from a geographical point of view, and hopes to complete his examination of the Iça within four months.

Obituary.

Robert Barkley Shaw.—The death of this eminent geographer, the pioneer of modern exploration in Eastern Turkistan, occurred on the 15th of June last, at Mandalay, where he occupied the position of Political Resident at the court of the King of Burmah. Lord Northbrook, the President of the Society, gave the following account of the life and achievements of our much-regretted Associate, at the Evening Meeting of the 23rd of June:—

“ Our Society and the public at large have sustained a great loss by the death of Mr. Shaw. He was born on the 12th of July, 1839. His early education was received at various schools on the Continent—in France, Germany, and Italy—where he acquired a complete grounding in the languages of Europe, forming a suitable preparation, aided by his natural talent in this direction, for the philological proficiency which he attained in the East. In 1853 he went to Marlborough School with a view to being trained for the Royal Military Academy; his desire being to enter one of the two magnificent professions, the Royal Engineers or the Artillery. But at the examination, in 1855—the first examination, I believe, of what is called the modern school at Marlborough—Mr. Shaw was carried out of the room in a fainting condition, caused by an attack of rheumatic fever, from which disease he had suffered when a child, and to which he has recently succumbed in the prime of life. Notwithstanding the ill-health he had suffered during the examination, he received, soon after its termination, a note from the head master, Dr. Cotton, saying that he had won the prize as the best of the modern side of the school. His attack was followed by a long and dangerous illness, and on his recovery his medical advisers declared that his constitution was such that he must be kept to a quiet, unexciting life: thus his military aspirations were effectually damped, and for the same reason he was debarred, by the inability to bear the necessary physical and mental strain, from entering any of the learned professions. After Marlborough, Mr. Shaw proceeded to Cambridge, where he entered Trinity College, and remained two years. About the year 1859 the Government of India, desirous to encourage the planting of tea, sold lands in different parts of India for the purpose of establishing tea plantations. Mr. Shaw was advised that that occupation would be beneficial to his health, and, fortunately for the public service, he went out to India, and settled in the Kangra Valley in the north-west. The locality is one of the most beautiful in the world, and the nature of the occupation suited him exactly. He had an opportunity of acquiring the language and becoming acquainted with the customs of the natives; and I may observe that one of the characteristics of Mr. Shaw was that with a great knowledge of the native character he was distinguished by a great sympathy with the natives and by his admirable manner of dealing with them. Having been at Kangra for some time, his high spirit and desire to contribute something to the knowledge of the world led him to make various expeditions in the Himalayas. It was supposed that up to that time no European since the days of Marco Polo had been across the Karakorum into the country of Kashgar and Yarkand, with the exception of M. Schlagintweit, who was killed there a few years previously; and although the Government of India discountenanced the project, believing it to be a rash one, Mr. Shaw started for Kashgar in the middle of 1868, and arrived at Yarkand a few weeks before Mr. Hayward, whose name is well known to the Society, under whose direction and auspices he made his adventurous explorations in Central Asia. Almost immediately after his return from Kashgaria, he accompanied Sir Douglas Forsyth in his mission to the same country; and on his return to England in 1872 he received the highest honour which the Royal Geographical

Society could give, namely, the Patron's gold medal; and the President, Sir Henry Rawlinson, than whom no one was more competent to give an opinion of the value of the discoveries and the additions to geographical knowledge which Mr. Shaw had given to the world, in presenting the medal, spoke of his discoveries in the highest terms. He said, 'The Patron's medal for the year has been awarded to Mr. R. B. Shaw for the services he has rendered to the cause of geography in exploring Eastern Turkistan, and, above all, for his very valuable astronomical observations,* which have not only enabled us to fix the longitude of Yarkand, but have afforded a general basis for a map of Kashgaria . . . Sir Roderick Murchison, in his last anniversary address, described in such glowing terms the great geological and geographical value of the survey of the country between the high table-lands at the head of the Karakash River and the valley of the Upper Shayok River, which was executed by Mr. Shaw on his return from the Yarkand mission, and which will be found in the forthcoming volume of the 'Journal,' that any commendation of the work from myself would be superfluous.' He goes on to say that Mr. Shaw, 'mindful at all times of the interests of the Society, has, since he took up his abode at Leh, where he has been installed as Commissioner, in acknowledgment of his Turkistan services, busied himself in collecting geographical information regarding the adjoining countries.' What Sir Henry Rawlinson stated is really the case, namely, that in consequence of Mr. Shaw's services Lord Mayo appointed him to the political service of India. He was for some time Resident at Ladakh, and whilst there rendered great assistance to Sir Douglas Forsyth's second expedition to Yarkand. After Sir Douglas Forsyth's return in 1874, during the period when I was Vice-Roy in India, having to send to Kashgar the treaty that had been made with the Ameer of that country, and which had been ratified by me, the Government of India selected Mr. Shaw to return with that treaty. He fulfilled that duty with admirable discretion. It was not a very easy task. He was instructed to act according to the circumstances of the case, and if he found the Ameer did not desire him to remain in the country he was to return. He found that the Ameer did not desire to have a permanent English Resident there, and so he returned to India. Since that time I have known a good deal of the career of Mr. Shaw. After his return he was still employed in the political service, and rendered us very great assistance from his knowledge of those countries. Quite lately, in 1877, he was appointed by Lord Lytton Resident at Mandalay. You have all of you seen in the newspapers the recent accounts from that country, and have read of the terrible massacres which the king has committed. You will have observed that the conduct of Mr. Shaw under exceedingly difficult circumstances was courageous and discreet, and that he received the full approbation of the Government of India. He fell a victim to rheumatic fever, the same complaint which had interfered with his examination when he was a boy at Marlborough School.

"Mr. Shaw's career is a striking instance of how a high spirit and a desire to be useful in life are able to master any physical disabilities to which a man may be subject. Besides writing the account of his journey to Kashgar, entitled 'A Visit to High Tartary, Yarkand, and Kashgar (1871),' which I am told is one of the most popular books in the library of this Society, Mr. Shaw contributed to the Society two papers which were printed in the 'Proceedings.' † Those papers proved his learning as a student of historical geography and his diligence in collecting information. One was published in 1871, and the other, called 'Miscellaneous Notes on Eastern

* Vide 'Journal of the R. G. S.,' vol. xli. (1871) p. 373.

† "Position of Pein, Charchand, and Lob Nor; with Tables of Routes," 'Proceedings,' xvi. (1871) p. 242, and "Miscellaneous Notes on Eastern Turkistan," ib. xvii. (1872) p. 195.

Turkistan,' was published in 1872. He also availed himself of the remarkable opportunities afforded him by his official position at Yarkand to make most important contributions to linguistic knowledge. He was a good Persian scholar, and his ability to converse freely with the high officials of Yarkand and Kashgar, in this language, no doubt facilitated his progress through this region. His sketch of the Turki language as spoken in Eastern Turkistan * is quite unique of its kind, and portions of it are quoted in terms of the highest praise by one of the greatest French scholars in the Osmanli dialect of that language, which is its best known representative. Mr. Shaw also contributed to the journals of the Bengal Asiatic Society two still more remarkable essays, on a language previously totally unknown, the *Ghatchuk*, spoken in the valleys of Wakhan and Sar-i-Kul, by a people who appear to be intermediate between the Indian and Iranian branches of the Aryan family. Mr. Shaw was no mere collector of words or recorder of vocabularies. He had the instinct of a linguist, and his writings are valuable not only for what they record, but for what they suggest to fellow-labourers in the same field. I am quite sure I shall not be misinterpreting the feelings of the Royal Geographical Society in giving this notice of Mr. Shaw's distinguished career, and in communicating to his relatives the deep sympathy which the Society feels with them in their loss."

Dr. Clement Williams.—The death is also recorded, at the early age of forty-six, of Dr. Clement Williams, who had been a Fellow of our Society since 1874. Dr. Williams was formerly an assistant-surgeon in the 68th Regiment. From his long residence in Burmah, commencing in 1858, he had become a great authority on all matters connected with that country. He visited Upper Burmah in 1860, and contrived to ingratiate himself with the late king to such an extent, that he was able to lend very material aid in the conclusion of the treaty of that epoch between Burmah and Great Britain. Shortly afterwards he was appointed first Political Agent at Mandalay, a post for which he was well fitted by his knowledge of the Burmese character and language, no less than by his general abilities. When at Mandalay, Dr. Williams devoted himself to the study of the question of an overland route between Burmah and the western provinces of China, in which he always took a deep interest, and after considerable difficulty he was allowed to visit Bhamô, being the first Englishman to do so. Whilst there, he made excursions up the Taping and other tributaries of the Irrawadi, and collected much commercial and cartographical information, both by his personal observations and from his inquiries among the Shans, Kakhyens, and frontier Chinese. During his investigations, however, an insurrection broke out at Mandalay, and Dr. Williams was compelled to return without achieving his great object of reaching the Chinese frontier. As the result of his journey, he prepared an elaborate memorandum for the Government of India on the question of British trade with Western China, which was published, with a map, in the 'Journal' of the Asiatic Society of Bengal for 1864. Though this paper mainly deals with the political and commercial aspects of the subject, one section of it is devoted to the physical geography of the region proposed to be traversed by the various lines of communication. In 1868 he published, through Messrs. Wm. Blackwood and Sons, a small volume, giving an account of his journey, under the title of 'Through Burmah to Western China,' which was accompanied by a sketch map, on which the trade-routes were laid down. While at home on leave of absence, Dr. Williams retired from the Government service, and returning to

* His 'Turki Grammar and Dictionary' reached a second edition, during his stay in Calcutta in 1877-8. Mr. Shaw was engaged subsequently in writing a history of Kashgar in the seventeenth and eighteenth centuries:

Burmah in 1867, he devoted himself chiefly to the promotion and development of commerce. It is stated that he has left behind him many valuable maps and plans of Upper Burmah, some of which were but recently executed. While on his way home, our Associate died, on June 26, at Castagnolo, near Florence, of typhoid fever, contracted at Naples.

CORRESPONDENCE.

Longitude of Lake Nyassa.

STANFORD'S GEOGRAPHICAL ESTABLISHMENT,
13, Long Acre, July 19th, 1879.

DEAR SIR,—As the question of the longitude of the north end of Nyassa is somewhat interesting just now, from the fact that the Expedition under Mr. Keith Johnston is on its way there, and an allowance of at least twelve days' march must be made for every degree of longitude, attention may be drawn to a few points in its geographical history.

On Livingstone's first autograph map of the lake, the longitude of the point known as Mankambira's was given as 35° , but in subsequently re-plotting the compass bearings, Dr. Kirk made it $34^{\circ} 47'$. In the map prepared for "Zambesi and its Tributaries," the former longitude, viz. 35° , was adopted in the drawing, but it was altered to $34^{\circ} 21'$ in the engraving, although the longitude at the south end was retained, thus giving the lake an incorrect north-west and south-east trend. That Livingstone did not accept this correction may be inferred from the fact that on the autograph map brought home with his last journals and made by him certainly later than 1870, the lake is still shown as lying on the 35th meridian.

After a careful comparison of the observations and dead reckoning made by Dr. Livingstone on his last journey, with the autograph maps above referred to, the longitude of Mankambira's was reduced to $34^{\circ} 41'$, and was thus engraved on the map accompanying the 'Last Journals.' Mr. Young accepted this longitude in making his map in 1876. And it must be gratifying to all admirers of Livingstone to find that the only authority since his time, Mr. Cotterill, places it in $34^{\circ} 28'$, stating at the same time that he finds Livingstone's outline of the western coast accurate in all its chief features. Adding the northern extension of the lake as given by Mr. Cotterill to the map in the 'Last Journals,' the mouth of the Ruambadzi falls on $34^{\circ} 50'$, and if we take the observation at Mazoti's Pass favoured by Mr. Cotterill— $34^{\circ} 25'$ —and add $15'$, the meridional difference between it and the mouth of the Ruambadzi, the result will only necessitate a reduction of $10'$ in the longitude. This is all the westing that can at present be fairly allowed.

In several maps recently issued, and which have been prepared with a disregard for authority which seems hardly justified, the mouth of the Ruambadzi is given fully a degree too far west, and the lake is made to lie in a north-west and south-east direction instead of nearly due north and south.

It follows from the above that the distance from Dar-es-Salaam to the north end of the lake is considerably less than from London to Edinburgh, and we may fairly hope that Mr. Keith Johnston will reach it in from eighty to ninety days. The steamer from Livingstonia should run up to the head of the lake to make inquiries and bring back the news of his success; but as the Expedition left the coast on the 19th May, and it will probably take the steamer at least a week to run up from the settlement, no time should be lost if our Scotch friends desire to be useful in this matter.

I have, &c.,
J. BOLTON.

REPORT OF THE EVENING MEETINGS, SESSION 1878-9.

Fourteenth Meeting, 23rd June, 1879.—The Right Hon. the Earl of NORTHBROOK, G.C.S.I., President, in the Chair.

PRESENTATION.—*Augustus B. Wylde, Esq.*

ELECTIONS.—*Charles Arthur Barday, Esq.*; *Major-General Samuel Wylie Crawford, U.S. Army*; *Thomas Bird Edmonds, Esq.*; *Colonel J. B. Finlay, U.S. Army*; *Rev. Thomas Foulkes*; *Montagu P. Hart, Esq.*; *William Harwood, Esq.*; *Robert Wilson Lees, Esq.*; *Colonel Chas. MacMahon, Madras Staff Corps*; *W. Rickford Smith, Esq.*; *R. C. Temple, Esq., Lieut. 1st Goorkhas*; *Rev. Paul Williams Wyatt, B.A.*; *Augustus B. Wylde, Esq.*

Previous to the reading of the papers announced for the evening, the PRESIDENT announced the recent death of Mr. R. B. Shaw, the distinguished traveller in Eastern Turkistan and Gold Medallist of the Society, who had been recently acting as British Resident at Mandalay. He gave a succinct narrative of his life and public services. (*Vide Obituary, ante, p. 523.*)

The following were the subjects of the evening:—

Notes of a Trip from Zanzibar to Usambara, in February and March, 1879. By Keith Johnston, Esq. (will be published in a subsequent number of the 'Proceedings').

Native Routes from Dar-es-Salaam towards Lake Nyassa. By Keith Johnston, Esq. (published in the July number, p. 417).

Before the papers were read, Sir RUTHERFORD ALCOCK, at the invitation of the President, made a few remarks on the subject to which they referred. He said both papers related to Mr. Keith Johnston's proceedings in Africa. The first gave an account of a visit that he had made to the Usambara country on the East Coast, where he had collected a great many interesting data. The other contained the information which he had obtained as to the best route for penetrating from Dar-es-Salaam to the head of Lake Nyassa, and from thence to Tanganyika if possible. It was now three years since the African Exploration Fund Committee was appointed, in order that the Royal Geographical Society and the nation, which in one sense they represented, might take its part in that work of opening up Central Africa, in which nearly every sovereign in Europe was interesting himself. As was well known, the King of the Belgians called a Congress to consider what might be the best means of opening up the unknown parts of the continent, and especially the finding a road from the coast to the great chain of lakes which formed of themselves a magnificent water communication, if only an approach to them could be discovered, by which travellers and caravans might travel with some degree of safety and convenience. Last year an account was rendered to the subscribers to that fund, in which a statement was made of the various steps that had been taken by the Committee, so that the Geographical Society, which had previously taken the lead for so many years, from the days when Speke and Grant and Burton discovered the sources of the Nile to the present day, might not be left in the background. What the Committee could do depended of course on the means placed at their disposal. That was very distinctly stated at the beginning. They had received warning from the previous expedition that to send an expedition into the centre of Africa without clearly seeing their way to get it out again, was a very critical and expensive proceeding. Although the Geographical Society was supposed to be very rich, the very great outlay and indefinite liability attendant on that expedition were such as the Council would not like to incur again; for it was impossible to leave their envoy in the centre of Africa to perish, and they had no alternative but to go on paying, however much it might be, until they could get him out. They did not wish to fall

into that error again. First of all, their funds would not sanction it. He was sorry to say that the amount subscribed to the African Exploration Fund was not exactly what they had been led to expect, considering the interest that was felt in the opening up of the dark continent. The total sum received was between 3000*l.* and 4000*l.*, of which nearly half was contributed by the Geographical Society itself. Under these circumstances the Committee came to the conclusion that anything they attempted must be of a very modest character. Probably the problem most interesting and most important at this time in reference to establishing communication from the east coast to the great central lakes, was to discover the best practicable road from the coast to the head of Lake Nyassa. From Dar-es-Salaam to Lake Nyassa there was a transit of 300 or 400 miles, and a great part of that country was still unexplored. Captain Elton, who unfortunately lost his life in the effort to make his way from Nyassa to the coast, and some others, had travelled in parts of that region, but as yet it was quite unknown which was the best route and whether, indeed, there was any practicable. The discovery of such a route the Committee had set before themselves as their main object, and if they attained it they would conceive that they had added one very precious link more to the chain which led from the coast in various directions to the great lakes. It was calculated that that might possibly be accomplished in the course of six or nine months, if the expedition met with no unforeseen accident; for that, of course, they must be prepared. The first three officers sent out by the Belgian mission had all died, and taking into account the chances of robbery, sickness, and death, it was always wise to speak with great reserve with regard to the possible results of even the best contrived plans. Every possible precaution had been taken to secure success, and on the 18th May Mr. Keith Johnston wrote from Dar-es-Salaam, the point from which he would start, that he had secured the services of 140 pagazis to carry the means of subsistence. The Society was perfectly aware that travellers in that part of the world had to carry with them coin in the shape of English or American cloth, which was a rather bulky material, and involved the engagement of a great number of porters. Those pagazis were not all quite honest, a great many were addicted to desertion, and if a traveller lost his porters he was simply exposed to utter starvation. Mr. Keith Johnston wrote in excellent spirits. Dr. Kirk was good enough to obtain a steamer from the Sultan of Zanzibar, and to go with Mr. Johnston to Dar-es-Salaam, in order to make sure that no difficulties were raised by petty chiefs, and to see him properly started. A letter would be read from Dr. Kirk stating that he had not only seen the expedition off without any cause of anxiety, but that twelve days after, when he was doing the same kind of office for the Belgian mission, no news of Mr. Johnston had been received. That, of course, was the best news, because it showed that he had proceeded on his way without any *contretemps* which necessitated communication with the coast. The Belgian mission had landed four elephants, and it appeared that on that coast it was a work of great difficulty. One of the elephants thought it better to go back to the vessel instead of swimming ashore. The African Exploration Fund Committee had hoped to call a general meeting of subscribers this month, but they were unwilling to summon them until they could give some definite information as to what had been done with their subscriptions. He took this earliest opportunity of informing the Society at large, among whom chiefly were the subscribers, that the expedition had been launched with every prospect of success, and he was quite sure they would wish them God speed, not only to the head of Nyassa, but if the funds, which at present were very scant, would permit, to the southern end of Tanganyika. If Mr. Johnston succeeded in that he would really have accomplished a very great feat, of which the Society might well be proud, and from which the world would derive benefit. He trusted

that means would be obtained to enable Mr. Johnston to carry out the second part of his journey, but the Committee had just sent out the last 500*l.* they had to dispose of. It rested with the 3000 or 4000 members of the Society to say whether Mr. Keith Johnston should or should not be supplied with the means of completing the work which he had undertaken. He could not anticipate that sufficient support would not be given, or that Mr. Johnston would have to return with his mission uncompleted for want of a few hundreds or a thousand pounds.

The papers above named were then read by Mr. Markham, who also read the following letters which had just arrived by the mail from Zanzibar.

1.—LETTER FROM DR. KIRK.

ZANZIBAR, 30th May, 1879.

SIR,—I have the honour to report the departure of the expedition under Mr. Keith Johnston for Nyassa.

Mr. Keith Johnston and his companion, together with a party of 138, left Zanzibar on the 14th May, on board one of the Sultan's steamships, placed for the time at my disposal for the purpose. Leaving the harbour of Zanzibar on the morning of the 14th inst., the whole party were safely landed at Dar-es-Salaam the same day a little after noon, thus escaping the inconvenience and danger of a dhow passage. In order to be able to render every assistance to the expedition at the first start, and prevent the intrigues and delays that otherwise would be caused by the petty native chiefs of the coast, I accompanied the expedition as far as Dar-es-Salaam, returning so soon as the party had been provided with guides and had set out on the march. From all I could learn at Dar-es-Salaam, Mr. Keith Johnston commences his journey under the most favourable combination of circumstances possible, and will within a few days enter a new and interesting region hitherto unvisited. I anticipate that for the first ten or fourteen marches his course will follow a route a little nearer the coast than may have been expected by the Royal Geographical Society; but the present state of the country, as he will himself fully explain, renders this advisable. He will endeavour to follow a diagonal course, so as to reach the junction of the two streams, Ruaha and Urunga, which united become the River Lufigi, that enters the sea beyond Mafia. He will then, in all probability, follow the Urunga, which is the main stream, and is said to be navigable for a distance equal to many days' march, as far, in fact, as the mountains, which here are said to be far from the coast.

Hitherto, many difficulties have stood in the way of this region, rich in cattle, grain, and ivory, being opened up, but at present there is every prospect that the powerful tribes which dwell in the plains will be ready to receive travellers, and that the road, as far as the further limits of Ubena, will be found open.

The first people met with on the probable line of march after finally leaving the coast, are the Khutu, a quiet agricultural tribe, occupying a district that reaches from the now ruined town of Zungomero to Berobero, separated from the River Ruaha by an uninhabited plain. The people of Mhenge, said to be of Maviti or Zulu extraction, occupy the country between the Ruaha and the Urunga; they have cattle, and their country abounds in elephants, which in the time of Mui Gumbé were preserved, a restriction said now to be removed. Among the Mhenge Mr. Keith Johnston will travel for some time, leaving the Magwangwara and Magange, on the right bank of the Urunga (Ranga), unvisited at present.

Regarding the River Lufigi, we were told by men who professed to have been on it, that the distance from the sea to the junction of the Ruaha and Urunga is eight days' march by land, and that in this part there is one rapid only, at a place called Pangana, two days from Mpenbeno. This rapid, they say, is widened and covered when the river is in flood. The Ruaha is spoken of as a rocky, swift river,

but with many navigable reaches, on which are canoes. The Uranga, on the other hand, is said to be deep, wide, and navigable for eight days' march above the junction.

Of the northern part of Nyassa Lake nothing whatever is known to the people of Dar-es-Salaam, and apparently the high mountains had not been visited by them. The scenery on the upper waters of these streams was spoken of as magnificent, and mention was made of wonderful waterfalls and valleys enclosed by mountains, to which the people retreat in time of war; but for a description of these we must await the result of Mr. Keith Johnston's expedition.

JOHN KIRK,

H.M. Agent and Consul-General, Zanzibar.

To the Secretary to the Royal Geographical Society, London.

2.—LETTER FROM MR. KEITH JOHNSTON.

R.G.S. African Exploration Fund, East African Expedition.

DAR-ES-SALAAM, 18th May, 1879.

SIR,—I have pleasure in informing you that the expedition under my charge is ready to start inland to-morrow morning. The men and goods were safely shipped on board the Sultan's steamer *Star* on Wednesday; not one man was missing from the list. On Thursday morning (the 15th) we left Zanzibar at daybreak, and arrived here soon after noon.

Dr. Kirk kindly consented to accompany the expedition as far as Dar-es-Salaam, and his influence here has been most beneficial in forwarding the final arrangements for our departure.

I have found it necessary, after further consultation with natives who know the country between this and Mhenge, to modify the line of route taken on starting from Dar-es-Salaam to some extent from that which I indicated in my last letter. So much uninhabited country would have to be crossed, apparently, by following a line south-westward from Kola on the Mackinnon-Buxton road, at the start, and grain is still so scarce in the Uzaramo country, that I have decided to turn off south-westward from Dar-es-Salaam almost directly, and to strike into the Berobero route further south, by a line on which villages are more frequent, and food more easily obtained. As it is, I have been obliged to engage fifteen extra men here, to carry food for the expedition for the first ten or fourteen days.

The following discussion then took place:—

Sir FOWELL BUXTON said he was one of the few friends who united with Mr. Mackinnon in that gentleman's venturesome experiment. Sir Rutherford Alcock had already alluded to the Congress which met at Brussels about three years ago under the presidency of the King of the Belgians, when the various modes of opening up the interior of Africa were taken into very careful consideration. He thought the resolution which was come to most unanimously at that Congress was that, for the purpose of opening up Africa to commerce, the most useful experiment would be the making of roads. Many members of the Society knew how much Mr. Mackinnon had done by his steamers towards opening up the trade of the coasts of Asia and Africa, and he had entered warmly into the experiment of endeavouring to make a road into the interior. As with all experiments, there must, of course, be some disappointment, and those who had entered upon this work could not pretend not to have had their share. He supposed it was true in little, as occasionally in greater matters, that there was sometimes a want of sufficient control when the

controllers were separated from their agents by many thousands of miles ; and perhaps in this new venture loss and mistake had arisen from the want of such control. Recent experiments, however, might lead them to feel that no blame could be imputed even if mistakes were made. A person who attempted to penetrate an African bush might very well find that the first line he hit upon was not the best, and have to choose another. It was perfectly possible that what Mr. Keith Johnston had pointed out was true, namely, that the best line had not been chosen, but it was obvious that Mr. Johnston detected that fact when he was on the line which had been chosen ; and it might be that a more satisfactory course would be found in the future. In point of fact that had already been the case. In some parts the line which had been taken had been found to be too much under flood water during the rains, and it had been altered and carried into higher ground. He trusted that any other mistakes that might arise would be rectified without any very great difficulty. In the case of those streams which during half the year were no streams at all and during the other half were raging torrents, it might be best not to try bridges, but to harden the bottoms and remove irregularities, so that they might be traversed by men on foot or by wheeled conveyances. He thought more attention than had been already given should be paid to an experiment that was being tried on the island of Zanzibar. He believed that a few years ago there were no roads whatever on that island, but there was now a road 4 or 5 miles long, between Zanzibar and the University Mission station. Along that road there was now considerable traffic, and the experiment of using a traction engine upon it was to be made. Mr. Mackinnon's road was a pure experiment, but from the letters which had been received from the agent in command and from Mr. Keith Johnston, it was manifest that some good had already been accomplished by it. It was at least something to know that the natives on the spot had been trained to make a road, and had so seen the use of it that they had made other branch roads to their own villages. There was therefore a fair prospect of the road becoming a permanent one, both because it was largely used by the natives, and also because they were learning to make branch roads from it. Another change which had taken place in that district was that, instead of being paid in cotton goods, which were troublesome to carry, the natives were learning to a considerable extent to take their pay in coin. The more that habit was introduced the more it would tend to facilitate African travel, and, as it had penetrated the coast-line, he hoped it would rapidly extend to the interior. He was inclined to think that it would be well to regard the progress of the road as a matter to be carried on more slowly than might at one time have been anticipated. There were reasons for feeling that at present it could not be known what was the best line to pursue after leaving the town of Kola, about 35 miles from the coast, and it might prove expedient to complete that portion, and not to be in any great hurry to go beyond that point. Those who had been Presidents of the Royal Geographical Society must have learned that in African matters it was well to be very patient, and if such proved to be the case in the present instance, he felt sure that Mr. Mackinnon would not regard the delay with any feeling of disappointment.

Colonel GRANT had listened with very great pleasure to the report sent home by Mr. Keith Johnston, who was highly qualified in a literary point of view to give a clear and full description of what he saw. After leaving Dar-es-Salaam, he had before him a journey of 480 or 500 miles. If he reached the north end of Nyassa he would be 280 miles from the sea-coast. Then, if his followers stood by him, he would proceed 150 miles more to Tanganyika. He (Colonel Grant) had made a calculation of the rate at which he had travelled with Speke, and he found that on an average they only advanced 4 to 6 miles a day. Sometimes they went 25 miles a day, at other times only 2 miles ; then they would be detained by the chiefs, and

could not advance at all. Stanley stood at the head of all African travellers for rapidity of travelling, because he pushed on by strong means, and allowed nothing to stop him. In his case the average was about 8 miles a day, nearly double that of other travellers. If Mr. Keith Johnston got through at the rate of 4 miles a day it would take him two to three months to touch Nyassa, and then one to two months to reach the southern end of Tanganyika. Allowing four months for the return, he would be back at Zanzibar by the end of December; so that in the beginning of 1880 accounts might be received of his discoveries. All present must hope that everything would go well with him, and that he would return in health, able to take another journey. Bombay, the faithful native of the Wahio tribe, who accompanied Burton and Speke to Tanganyika, Speke and himself (Colonel Grant) to Egypt, Stanley on his first journey when he found Livingstone, and Cameron across the continent, had sent him a letter which said, "Bana Grant,—I, Bombay, send for my old master plenty salaam. I have been many years with white men, Cameron, Speke, Stanley, &c., but have not yet seen England their home, and as I am getting old, I should like to see the land of my old master before I die." He was now a pensioner of the Royal Geographical Society, and with such an honour as that he might well rest satisfied.

Captain CAMERON said that everyone must be glad to hear that at last the expedition of the African Exploration Fund had made a fair start into the interior under such an excellent leader as Mr. Keith Johnston. The country which was about to be explored was certainly one of the most interesting links remaining to join the coast with the lake regions of Africa. He hoped that Mr. Johnston would not travel to Nyassa according to the position laid down in the map before the Meeting, for his own opinion was that the head of that lake was much further to the west. Captain Elton, who had been there, placed it nearly in the same position as he (Captain Cameron) had done, judging from the variation of Lake Tanganyika. He also hoped that Mr. Johnston would not meet with Mazitu at Mhenge, who were known elsewhere by other names. He himself met some of these people at the south of Tanganyika. They were armed with spears and bull-hide shields, like the Zulus. Up to that time they had never been known to attack caravans, because they found it more advantageous to sell their slaves to the caravans. If they had settled down they might have improved in manners, but after spending two days in a village with them he was very glad to get away without any trouble. Their way of settling in a village was to drive everybody else out, killing those who attempted to stop. They would then remain there until they had eaten or burnt everything, and then they would go on. The origin of the tribe was supposed to be the same as that of the Kaffirs, but their numbers were recruited from all the outcasts and blackguards of the regions they passed through. He hoped sincerely that Mr. Keith Johnston would not find them at Mhenge. M. Serpa Pinto, who had made his great journey across the continent to Pretoria and the Transvaal, had traversed a great portion of country which was new to geographers. When he was at Bihé he (Captain Cameron) heard of the sources of the Kubango, and supposed it to be the same as the Uka-vango discovered by Andersson in 1859; this supposition had been proved to be correct by the work of the gallant Portuguese officer. M. Serpa Pinto had proved himself a worthy successor of the Portuguese explorers of former days, commencing with Vasco da Gama, who doubled the Cape of Good Hope and assisted to establish that chain of forts which extended from Lisbon to Macao, continued by Dr. Lacerda, who went to the country of Cazembe and there died, and by Majors Monteiro and Gamitto who also reached Cazembe. He was glad to find that the Portuguese were again vindicating their right to be considered among the foremost of geographers, and by the treaties lately entered into with the British Government they were

also going to assist in giving the final blow to the slave trade, a result which was earnestly desired by all geographers.

Rev. J. P. FARLER said he was very glad to hear that Bishop Steere had been able to let Mr. Keith Johnston have Chuma, Livingstone's old servant. He (Mr. Farler) had frequently travelled with him, and had always found him a most valuable servant, and remarkably capable of dealing with the natives. He had but one fault. He could not be trusted with the cashbox, for he would expend four times the amount that was necessary. Abdallah, whom Mr. Johnston had mentioned as being the best man in the Usambara country, was not a chief at all. He was merely a runaway Comoro man from Zanzibar, where he got into debt and fled from his creditors. He became a sort of secretary to Simboja, the son of old Kimweri, but he quarrelled with him, and took service under Kibanga. Since he had been at the meeting he had opened a letter, in which it was stated that the Wakalindi were making a great raid on the Wasambara. Since old Kimweri's death the country had been constantly harassed by these tribal wars, and the process which was going on in Usambara was going on also throughout the whole region which Mr. Johnston would have to traverse. If only some little law and order could be introduced into that region, he was quite sure that the towns now desolate would be quickly re-peopled. Until that occurred all expeditions would cost very large sums of money, and would be carried on with very great difficulty. He went to Dar-es-Salaam with Mr. Mackinnon's first party two years and a half ago, and acted as interpreter, and made many inquiries about the route to be followed. He then heard that there was an immense range of mountains between that place and Nyassa, and that no route went direct, but the ordinary route was to go down the Kilwa valley. The range was described as the highest in the country, with sides as steep as those of a house. Mr. Johnston had alluded to the employment of donkeys, but he was afraid they would not be found to answer. He himself once bought several from a native, and tried to work them, but they would never cross water, and whenever they came to a stream, the men had to unload the donkeys, and tying them with a rope, pull them across the river. Of course on a journey of any length such delay was most irksome, and therefore he sent the donkeys to the beach market, and did what Englishmen very rarely did—sold them for more than he gave for them. He did not think that Mr. Johnston would find much delay from the chiefs. A few years ago when Speke and Grant travelled, those parts they found a great deal of jealousy on the part of the coast Arabs, but that state of things had passed away. The motives of the travellers were better known; they were found to be peaceable people, doing harm to no one, and the chiefs and Arabs were now helpful to them. He had always found the chiefs willing to give every information and assistance. If the road that Sir Powell Buxton had been speaking about could be made, he was sure it would be a great blessing to that part of Africa. Mr. Randolph, a member of the Universities Mission, had made a road from Mbweni into the town of Zanzibar, a distance of about 4 miles. The Sultan had sent to England and bought a pair of ponies and a pony carriage. He had found it so pleasant that he intended to make other roads in different parts of the country. The road already formed was called the Great Road, and there was a large traffic upon it. Mr. Randolph and the native boys had also made capital bullock carts, and trained bullocks to haul stones for building. A traction engine was now on the way out. All the carrying had hitherto to be done by the slaves. It was now proposed to do away with the slave labour, and substitute a traction engine.

Rev. HORACE WALLER said thanks were due to Viscount Duprat for much which had taken place of late years between the two Governments of Portugal and England. Everyone was most anxious to read the details of the concession that had been made

on the part of Portugal, and of which a sketch had appeared in the newspapers. It must not be forgotten that nature had made a waterway in Africa from behind the Portuguese dominions on the East Coast. A person might go in a vessel from Portsmouth to the north end of Nyassa with the exception of 70 miles of cataracts on the Shiré. Therefore, although the opening up of East Africa by roads might be regarded in a most sanguine light, he hoped that the efforts of the Portuguese and the English would be so far successful that they would eventually have to thank nature more than the explorers for all that she had done for them. Livingstone, with a keen eye, saw that the centre of Africa was to be reached by this waterway, and it would be many years before he would be found to be wrong. He took this opportunity of offering to Viscount Duprat the testimony of an old missionary and traveller with regard to the good which would result from Portugal and England working together in the interior of Africa. There was room for all, and the step which had just been taken would put an end to many of those misconceptions which had stained the past, and leave a clean page for future deeds of philanthropy, of commerce, and of Christianity.

The PRESIDENT, in concluding the meeting, said that Viscount Duprat had told him that day that he had received from Portugal the full account given by Major Serpa Pinto of his expedition. He requested the Viscount, if possible, to give the Meeting an account of it; but unfortunately it had only arrived that day, and there had not been sufficient time to peruse it with that attention which was necessary in order to give the Society a proper analysis of so important a document.

The President then declared the Session 1878-9 terminated, and adjourned the meeting to the second Monday in November.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—June 20th, 1879: M. DAUBRÉE in the Chair.—The Meeting was informed that the late M. de Khanikof had bequeathed to the Society all his books relating to geography, and that the legacy had been duly accepted.—The President announced that Major Serpa Pinto, the Portuguese explorer, was about to visit Paris, and that a special reception would be arranged for him by the Society.—A letter from Dr. Stecker, the scientific member of the German African Expedition now endeavouring to penetrate Central Africa via Tripoli and Wadai, was read, dated from Benghazi on the 26th May. Gerhard Rohlfs had been stoned by the people at Djâlo, and a second time at Aujila; even musket-shots had been fired at the house he occupied. Dr. Stecker had been sent to Benghazi to obtain aid from the governor, but the latter had shown a most apathetic disposition, and had himself been robbed of six camels by his people, without being able to obtain any reparation. However, by the aid of Consul Rossoni and some of the chief traders at Benghazi, Dr. Stecker expected to be able to rejoin M. Rohlfs with guides of the Zouaya tribe, whose seat is at Kufara. In this case the Expedition could march forward to the latter town, and from there continue its route towards Wadai, with the Medjabra caravan. Meantime Mr. Rohlfs had effected his retreat to Benghazi. According to Dr. Stecker, the longitude of Djâlo is not $19^{\circ} 35'$ E. of Greenwich, as Beurmann gave it, but $21^{\circ} 25'$. Neither this town nor Aujila is situated in an area lying below the sea-level, as hitherto supposed. Djâlo is 60 feet and Aujila $98\frac{1}{2}$ feet above sea-level. Dr. Stecker gives also for the position of Sokna figures which differ strangely from those of Ritchie and Vogel:—viz. $26^{\circ} 55' 45''$ N. lat., $16^{\circ} 20'$ E. long. (Greenwich), instead of $29^{\circ} 4' 4''$ N. lat. and $16^{\circ} 51'$ E. long. He reports further that

on the night of 24th-25th, of February, near Mount Ferdjan, during a violent storm from the south-west, there was so strong a development of electricity that he elicited sparks of 10 centimètres from the part of his tent exposed to the wind. He was able, by wetting his finger, to trace fiery letters in the air.—M. Marié-Davy, Director of the Observatory of Meudon, to whom this subject was referred, did not consider these facts exaggerated.—A paper was read "On the projected creation of an Inland Sea in Eastern Algeria," by Dr. Cosson, of the Institute. This sea, he maintained, would not ameliorate the condition of the country around it, nor would it attract the trade of the Soudan towards Algiers. On the contrary, it would facilitate the obtaining of arms and munitions of all kinds to the independent tribes most hostile to the French, and even now in revolt against them. It would further affect disastrously the wells of the country, by fouling the water or making it brackish, if, as there is good reason to suppose, the sunken waters of the chotts communicate with the subterranean waters which feed the springs. Dr. Cosson, however, did not believe the scheme practicable: his arguments were contested by M. W. de Fonvielle, who, however, had little further to say than that Dr. Cosson should await the return of Captain Rondaire before coming to a decisive conclusion.

Geographical Society of Berlin.—May 3rd, 1879: Dr. NACHTIGAL, President, in the Chair.—After a few remarks on the death of Herr von Strampff, formerly member of the Council of the Society, the President announced that the Council had decided to contribute a sum out of the Carl Ritter Fund towards the travelling expenses of Dr. Theobald Fischer of Bonn, who was about to visit the libraries of Northern Italy in order to collect material for his work on the political and physical geography of the Mediterranean.—A letter was read from Gerhard Rohlfs, reporting that his Expedition had arrived on the 17th of March at Sella, and intended to leave that place on the 19th for the Djalo oasis, where, or at Aujila (belonging to the same group of oases), he would complete his preparations for the further march to Kufara, and await the arrival of the long-delayed presents from the Emperor of Germany to the Sultan of Wadai.—A letter was also read from Brussels, announcing that the two members of the new International African Expedition, Captain Popelin and Dr. Van der Heuvel, had left for Zanzibar on board one of the British India Steam Navigation Company's vessels, free passages having been granted through the intervention of Mr. Mackinnon. The same letter contained the information that the King of the Belgians had presented four Indian elephants to the Expedition, with the view of following up the experiment made by Colonel Gordon to utilise these animals for carriage in the African interior.—A communication was made to the Society respecting the well-known Peruvian traveller Wertheman, to the effect that he had in 1878 made a survey of the River Cahuapara, a tributary of the Amazons, and obtained much valuable information regarding the country of the Jivaro tribe of Indians. He intended in July 1879 to extend his survey to the Napo, the important stream which forms the chief route between the plateau of Quito and the main Amazons. The results of both these expeditions would be communicated to the Berlin Geographical Society.—The following papers were read:—1. "On the connection between the civilisations of the ancient Chinese and the Greeks." By Herr Hepke. 2. "On the position of Pekin in the modern world." By Baron von Richthofen.

June 7th: Dr. NACHTIGAL, President, in the Chair.—The President commenced the proceedings by reading an extract from a Report sent by the Hungarian traveller Count Széchenyi to the Austro-Hungarian Consul at Shanghai. The journey of exploration, in which this traveller is engaged, had been so far successful. On the 29th January he was at Si-Ngan-fu, the capital of Shen-si, and on the 23rd February at Lan-

chu-fu, a town in Kansu. In his Report he gives a narrative of his journey, and describes the difficulties of the passes, 9000 feet high, which were ascended at a temperature of 13 degrees below zero (Fahr.), and the desolation caused by the long-continued famine in the provinces of Shen-si, Shan-si, and Honan. In Kansu the traces of the fifteen years' Mahomedan rebellion are still visible, and it is scarcely yet repressed. The traveller was about starting for Suchau, twenty-five days' march distant; arrived there, he would decide as to the further course of the Expedition.—Regarding the German African Expedition, a letter (unfortunately undated) had been received from Herr Schütt, communicating the gratifying news that he believed the chief difficulties which had hitherto barred his way to the north-east had been at length overcome. His plan was to proceed from Kimbundo towards the meeting-point of the caravan roads which Pogge and Lux had made known as situated between Malange and Mussumbe. At the time of writing he was on the right bank of the Chikapa ($8^{\circ} 22'$ S. lat., $21^{\circ} 35'$ E. long.), a tributary of the Kassai, north-east of Kimbundo, and he intended to proceed across the Kassai to the country of the Kasilengo tribe, which extends as far as the Lualaba. He had surveyed and mapped the country he had passed through so far, and had besides made an ornithological collection of 400 specimens.—Letters from Gerhard Rohlfs were read, announcing that he had quitted Sokna on the 11th March, and on the 17th had passed through the Aujila oases towards Djâlo. His preparations for the continuance of his journey were hindered by the fanaticism of the Djâlo people, who belong to the religious sect of the Senusija, which is very powerful in Eastern Tripoli and Barca. He hoped to overcome this serious obstacle as soon as he reaches Kufara, in which oasis the fanatics have an establishment presided over by the Sheikh Hadji Omar Buttaue, with one of whose near relations Rohlfs was on terms of friendship. With a view to obtaining permission to travel to Kufara, Rohlfs sent Dr. Stecker to Benghazi, where the sheikh was staying. But he found the province of Barca very unsettled, the nomadic tribes of Suija and Magbarba having revolted against the provincial government, and the latter being utterly powerless to put them down. In spite of the influence exerted by the Italian Consular Agent, M. Rossoni, Dr. Stecker was unable to do anything, and Rohlfs was compelled himself to go to Benghazi. About the same time the Emperor of Germany's presents for the Sultan of Wadai had arrived at Aujila. Rohlfs adds that the latest reports from Wadai were to the effect that the new sultan Yusef, the successor of Ali, who had given Dr. Nachtigal so friendly a reception, was not averse to intercourse with foreigners.—Papers were read, 1. On his three years' travels on the Upper Nile, by Dr. Junker, illustrated by special maps drawn by himself of the districts he had explored; and, 2. "On the Postal and Telegraph Systems." By Dr. Fischer.

July 6th: Dr. NACHTIGAL, President, in the Chair.—Dr. Schweinfurth, the African traveller, was present at the meeting. A letter was read from Dr. Buchner, dated Malange, 8th April. Amongst other matters, he warns all travellers who intend proceeding towards the interior, not to arrive at Angola before the end of the rainy season; he also advises them to furnish themselves with woollen clothing, as the sudden variations of temperature in the interior, especially at night, make warm clothing a necessity. The same remark was made by Dr. Pogge with regard to travelling in Lunda.—Several letters had been received from the Gerhard Rohlfs Expedition since the last meeting. The chief had returned to Benghazi, with the intention of inducing the chiefs of the fanatical Senussi, by dint of a present of money, to withdraw their obstinate refusal to allow him to continue his journey to Kufara. Their demands, however, were so exorbitant, that Rohlfs was obliged to telegraph to the African Society for their sanction in paying the sum. The sanction was obtained, and it was hoped the obstacles were now, for the present, removed.—

Recent information regarding the Belgian International Expedition was communicated, to the effect that the original Expedition under M. Cambier was passing the rainy season at Tabora, and that Captain Popelin and other members of the second Expedition were at Zanzibar, in good health, on the 29th May, and expected to have everything ready for their departure towards the interior on the 10th July; profiting by the experience of the first Expedition, they intended to limit as much as possible the number of their native carriers. The elephants sent by the king would make a trial trip inland to Eva La Singa.—The following papers were read:—1. "Dove as Meteorologist and Geographer." By Dr. Neumeyer. 2. "On Photographic Theodolites and Photogrammetry." By Dr. Stolze, who illustrated his subject by instruments and diagrams.—The Society then adjourned until October.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

EUROPE.

Lasaulx, A. von.—*Sicilien. Ein geographisches Charakterbild.* Bonn (Strauss): 1879, 8vo., pp. 65. (*Williams & Norgate.*)

A sketch of the physical geography of the island.

Murray, J.—*A Handbook for Travellers in Switzerland, the Alps of Savoy and Piedmont, the Italian Lakes, and part of Dauphiné.* 16th edn., revised. London: 1879, 12mo., 2 vols., pp. 1–296, 297–555 (and double independent index), maps, plans.

This edition (issued in two small parts for mechanical convenience) has been entirely revised, and brought to one standard with the aid of recent information from the most experienced members of the Alpine Club. The introduction is rewritten, and an historical sketch added, the chief additions and corrections in the body of the work referring to Davos (which is becoming important as a winter resort), and the Engadine generally, Zermatt, the Pennine and Graian Alps and Dauphiné, and the Lombard and Maritime Alps. Considerable improvements also appear in the maps: of these, two of the Italian lakes, the northern valleys of the Pennine Alps, and the Graian Alps are entirely new; the general clue-map is redrawn on a larger scale and in a superior manner; the Monte Rosa and Mont Blanc district maps are redrawn; railways, routes, and names are added to the maps of Savoy and the Bernese Oberland; and the Wenden, Tschingel, and other glaciers, &c., to the S. and S.E. of the Lake of Lueerne map are redrawn.

Rossi, G. B. de.—*Piante Ieonografiche e Prospettiche di Roma anteriori al Secolo XVI.* Roma (Salviucci): 1879, fo., pp. 152, frontsp., Atlas, eleph. fo. (*Dulau.*)

In addition to the archæological interest attaching to this work, it contains accounts of the topography of Rome and its surrounding region at different historic periods up to the date mentioned in the title.

ASIA.

"Amu i Usbol."—Samara: 1879, sm. 8vo., pp. 55, frontisp., 2 maps.

This anonymous work (entirely in Russian, and for an analysis of which we are indebted to Mr. E. Delmar Morgan) has been received by the Society from H. Imp. H. the Grand Duke Nicolas of Russia. It is an unpretentious summary of the literature of the fascinating subject of the great changes in the course of the Oxus, from the earliest historic times to the present day, with the object of showing that a great trade-route through Central Asia is not only possible, but closely connected with the future of Russia in that region. The Imperial manifesto

of 1st January, 1874, is quoted in proof that military glory is not and never has been sought in the attempt to turn the Oxus into its old channel and close its Aral mouth, but that the sole aim has been and is to lead Russia to greatness by the path of peaceful progress and general development. The frontispiece is an excellent engraving of a portrait of Peter the Great by Natier now in the possession of the Graud Duke. The maps are without scale or degrees, and are apparently merely intended to illustrate the subject in a general way, as the key map does not agree with the larger one in details. They cover the region from the east of the Caspian to the head-waters of the Amu Daria.

Cordier, H.—*Bibliotheca Sinica* [Proc. R. G. S., March last, p. 221]. I. fasc. 2. Paris (Leroux): 1879, large 8vo., pp. 226–447. (*Trübner*.)

Concludes the notices of Historical works, and commences those referring to Religion.

AFRICA.

African Papers.—No. 1. Edinburgh (Elliot): 1879, 8vo., pp. 74, map.

The Rev. Dr. Stewart has here put together a few papers with the object of affording information on missions in South and Central Africa; and the present number refers to Lovedale and Livingstonia. Apart from the higher aim of this publication, and the account which it contains of the second circumnavigation of Nyassa (already given in the R. G. S. 'Proceedings'), it is noteworthy for the map of the east coast (by W. and A. K. Johnston) from Mombasa to Cape Colony, scale 130 miles to the inch, with a small inset map of Africa, and a larger inset of Nyassa, 27 miles to the inch. In this latter, the extreme northern end of the lake is placed considerably more towards the east than in the map illustrating the paper in R. G. S. 'Proceedings' of May last, being extended beyond the 35th degree of longitude; and the Konde Mountains lie in a westerly direction.

L'Afrique Explorée et Civilisée.—*Journal Mensuel, Première Année, 1879 to 1880.* No. 1, Juillet, 1879. Genève (Sandoz): 8vo., pp. 24, map. (*Dulau*.)

This commencement of a special monthly periodical, under the direction of Gustave Moynier, and edited by Charles Faure, commences with a paper on modern African exploration, in which the recent operations of the chief European nations are briefly reviewed; followed by short observations on commerce and industry in Africa, and concluding with 6 pages of current news. The map (by the Institut Cartographique militaire de Belgique) is of somewhat inferior execution, but is useful as showing the routes of the chief African explorers (including Major Pinto), on a scheme extending that employed by the late Winwood Reade, in his 'African Sketch Book,' and also used in the map accompanying the R. G. S. African Association Fund Prospectus.

Dutrieux, —, and Cambier, —. *Association Internationale Africaine. Rapports sur les Marches de la première Expédition.* Bruxelles-Étterbeek (Verhavent): 1879, 8vo., pp. 64, pl.

An account of the details of Dr. Dutrieux's expedition, which left Ugogo on December 1, 1878, from Mpwapwa to Uyui, during which M. Wautier succumbed to dysentery, and of M. Cambier's march from Mpwapwa to Thierra-Magazy (Mirambo's new capital), and his junction with Dutrieux's party and journey to Tabora with M. Broyon at the end of January, 1879. M. Cambier adds a paper on the armament, men, clothing, goods, and other material necessary for an expedition in this part of Africa. A table of the route from Bagamoyo to Mpwapwa, by Dutrieux, concludes the pamphlet.

Holub, Emil.—*Eine Kulturskizze des Marutse-Mambunda-Reiches in Süd-Central-Afrika.* Wien (Gerold): 1879, 8vo., pp. 210, woodcuts.

A separate issue of a series of papers in course of publication in the 'Mittheilungen' of the Vienna Geographical Society, of special interest at the present time, as discussing the country immediately adjoining the unknown region recently traversed by Major Serpa Pinto, during his journey from Bihe, and which represents the Barotse of Livingstone. The present work is entirely

devoid of personal narrative or geographical matter in the strict sense of the term, and no reference whatever is made in it to Dr. Holub's visits or explorations; it is confined to ethnographical, linguistic, and economic subjects, all of which are treated in considerable detail, with many illustrations, the only approach to topography being a sketch of the late King Sepopo's capital Shesheke. Some particulars, however, given by Dr. Holub in a recent lecture at Grahamstown, and reported in the Cape 'Eastern Star,' of 30th May last, may be here added. Sepopo's territory extends southwards to within 150 miles of the head-waters of the Zambesi; eastwards to about three days' travel (of 20 miles per diem) from the Victoria Falls, being altogether twenty-two days' travel from east to west; and northwards from two to twenty days' travel from the Zambesi. The empire is thus about 440 miles from west to east, and from 40 miles at its narrowest to 400 miles at its greatest width from south to north. It includes within its boundaries fifty-two tribes, subjugated by the Marutse at different times, who have each at their head a governor appointed by the king, the principal one of whom has the greatest influence in the empire next the king. Of the king's wives, fourteen resided at Shesheke, and the remainder, thirteen, in different parts of the kingdom, being employed in superintending the collection of the king's tribute. All ivory, indiarubber, and honey, and a special description of monkey-skin (the most valuable natural products of the country), had to be taken to the king. The whole of the male population is trained under a military system. The leading language is Makololo, with a few words of Serotse intermixed. The country is very populous, except in the tsetse region; it contains a number of large towns, and in some parts, as in the Barotse valley, agriculture flourishes to an extent unknown in any other part of South Africa. Up to 1872, the trade was principally with the West Coast Portuguese, but the capital was removed to its present site in order to facilitate trade with the English (apparently from the superiority of their guns); the present king, however, has prohibited all trade with whites.

There is no road from the Marutse empire to Zanzibar, and Dr. Holub believes the south to be the most accessible route to the interior. In the large country between the Vaal and the Zambesi only friendly natives exist. The region is highly populated, and abounds in tropical products, especially over the Zambesi. Ivory in large quantities is to be obtained, and the natives evince every disposition to trade. The country is for the greater portion a level plain, with few rivers of importance to cross, so that there are no physical difficulties in the way of constructing a railway, which promises satisfactory commercial prospects.

Shaw, J.—The Geography of South Africa, Physical and Political. London (Collins) and Cape Town (Darter & Walton): 1878, 16mo., pp. 100.

The first of a proposed series of school books for South Africa, to be edited by the author.

ARCTIC.

Weyprecht, K.—Die Metamorphosen des Polareises. Wien (Perles): 1879, 8vo., pp. 284, frontisp., map. (*Williams & Norgate.*)

This work, now completed (but with no index or table of contents) enunciates the views of the author with regard to the phenomena of polar ice, based on his personal experiences during the Austro-Hungarian Arctic Expedition of 1872-74. The different forms of ice and their origin, ice-pressure, ice in winter and summer, ice-metamorphoses, the movements of water and ice in the polar regions, and the ice of the circumpolar sea, are separately discussed. The map is a general one of north-polar regions, reaching as far south as 55° N. lat.

GENERAL.

Captain Cook.—Centenaire de la Mort de Cook, célébré le 14 Février, 1879, à l'Hôtel de la Société de Géographie. Paris (Soc. de Géogr.): 1879, 8vo., pp. 140, map.

A reprint (with separate pagination and title) of the May number of the Bulletin of the French Geographical Society, containing a short account of Cook's

life and work, by W. Huber; a history of the points in dispute between Cook and Dalrymple, by Dr. E. T. Hamy; and a summary of the progress of civilisation in Oceania since Cook's time, by C. de Varigny. Dr. Hamy also gives a descriptive methodical catalogue of the objects exhibited on the occasion of the centenary ceremonial, consisting of personal documents and relics, MSS., and printed copies of Cook's works, works of his colleagues, ethnographic material from the countries discovered by him, and objects specially illustrating the geography, &c., of the Sandwich Isles. The Cartography and Bibliography are undertaken by Mr. James Jackson, and, with the exhaustive aim usually apparent in French publications of this nature, include not only mention of the whole series of Histories of Travel, Biographical Works, Encyclopædias, &c., in which Cook's voyages and life are given (without, however, precisely specifying the volumes or pages containing notice of him), but the various editions and translations of his works, and the titles, &c., of botanical and other scientific treatises in which the results of the South Sea voyages are worked out. The map, on Mercator's projection, shows clearly the course of the great navigator on his three voyages.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Intelligence Branch, Quartermaster-General's Department.—Commission Européenne de délimitation de la Bulgarie, 1878.—Croquis générale de la Frontière Roumano-Bulgare. Dressé par le Capitaine Ardagh de l'État-Major Anglais d'après les levés expédiés de MM. Clarke, Ardagh et Chermiside, de l'armée Anglaise, Schoubart et Wolkoff, de l'armée Russe, Mehemet Ali Bey et Cherafeddine Effendi, de l'armée Turque, et Kultscher, de l'armée Roumaine. Sous la Direction de M. le Commandant Lemoyne, membre Français de la Commission. Scale 1:30,000 or 2·4 inches to a geographical mile. Compiled and lithographed at the Intelligence Branch, Quartermaster-General's Department, 1879. (*Stanford, agent.*)

Kampen, Alb. v.—Aduatuca, Caes. bell. Gall. V. 24-37; VI. 32-42, auctore Alb. v. Kampen. Scale 1:50,000 or 1·4 inches to a geographical mile. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879, Tafel 12. Justus Perthes, Gotha, 1879.

K. K. Milit.-Geogr. Institute.—Generalkarte von Central Europa, herausgegeben vom K. K. Militar-Geo. Institute. Scale 1:300,000 or 4·1 geographical miles to an inch.—The sheet A 11, Perpignan, has just been published. Artaria, Vienna. (*Dulau.*)

This sheet (A 11, Perpignan) completes the Austrian Military Geographical Institute Map of Central Europe, which comprises that portion of the Continent of Europe situated between latitudes 55° 44' N. and 41° 53' N., and between longitudes 30° 44' E. and 1° 6' W.; all details, and means of communication are laid down with great minuteness. The sheets of this map are sold separately, and the index enables anyone desirous of obtaining a map of any portion of Central Europe, on a scale of 4 geographical miles to an inch, to see at a glance what sheets are required.

Ministère des Travaux Publics.—Atlas des Ports maritimes de la France, with letterpress. Livraison 3. Ministère des Travaux publics. Paris. (*Dulau.*)

The third part of this atlas contains the following seventeen plans: 32, Cherbourg. 33, Carteret, Portbail. 34, Port de Régnéville. 35, Port de Granville. 36, Le Vivier, La Houle-sous-Cancalle, St. Briac. 38, St. Malo, Saint-Servan et Dinard. 39, St. Suliac, Dinan, La Richardais. 40, Saint Jacut, Le Guildo, Plancoët, Port Nieux, Erquy, Dahouet. 42, Port du Légué-Saint-

Brieuc. 43, Binic, Portrieux, Paimpol. 44, Port-Clos, Loguivy, Pontrieux, Lézardrieux. 45, Tréguier, Perros, Lannion, Toul-an-Héry. 47, Port de Morlaix. 48, Pensez, Pempoul, Kernic. 49, Roscoff, Isle de Bas. 50, Pontusval, l'Aher Wrach, Paluden. 51, Portsai, Argenton. The first two parts of this Atlas contain, (Part 1) plans of the Ports between Dunkerque and Étretat; (Part 2) plans of the Ports between Havre and Becquet. The Hydrographic Charts of la baie de Seine, la presqu'île du Cotentin, the Bay of St. Malo, des Col-du-Nord, and of the Coast North of Finistère, numbered respectively 15, 31, 37, 41 and 46, will appear in the fourth part of this Atlas.

Morales, D. José Pilar.—Plano de Madrid, por D. José Pilar Morales. Scale 1:10,000 or 7·3 inches to a geographical mile. Madrid, 1879. (*Dulaup.*)

ORDNANCE SURVEY MAPS.

1-inch General Maps:—

IRELAND: Nos. 195, 196, "hills shaded."

6-inch—County Maps:—

ENGLAND: Sussex, Nos. 39, 69. Middlesex, Nos. 7, 12, 18, 23, made full sheets.

SCOTLAND: Inverness, Nos. 7, 44 (Island of Skye); Sutherland, Nos. 104, 111, 112, 113.

IRELAND: Westmeath, Nos. 25, 32 (revised).

25-inch—Parish Maps:—

ENGLAND AND WALES:—Berkshire: Aldworth, 7 sheets; Englefield, 6 sheets; Streatley, 9 sheets; Sulham and ditto (detached), and Saltney Mead, 6 sheets. Nottingham: Mansfield, 13 sheets; Skegby, 5 sheets; Teversall, 10 sheets. Oxford: Goring, 12 sheets; Whitchurch, 8 sheets.

Town Plans:—

Edinburgh, 5 feet, No. 23a; Edinburgh, 5 feet, No. 23 (revised); Fermoy, 5 feet, 9 sheets. (*Stanford, agent.*)

GEOLOGICAL SURVEY MAPS.

6-inch:—

Durham, No. 46; Lanes, Nos. 15, 17, 22; Northumberland, Nos. 44, 106; Yorkshire, Nos. 9, 33, 38, 39, 77, 78, 82, 84, 93, and 94. (*Stanford, agent.*)

ASIA.

Indian Government Surveys.—General Maps of Bombay Presidency. The Presidency of Bombay, showing the Divisions of Collectorates, Talukas, and Principal native States. Photozincographed at the Government Office, Poona, 1877. Scale 20 miles to 1 inch. On 2 sheets. Size 54 inches by 36. Coloured. —Part of the Presidency of Bombay, showing the Divisions of Collectorates, Talukas, and Principal Native States, and including the whole of the Northern and Southern Forest Divisions. Printed in colours, &c., at the Government Office, Poona, 1876. Scale 20 miles to 1 inch. Size 40 inches by 27. Coloured. —Postal Map of the Bombay Presidency, showing the Post Offices and Postal Lines. Compiled from information supplied by H. E. M. James, Esq., Postmaster-General. January, 1878. Scale 32 miles to 1 inch. Size 28 inches by 20. —The Deccan, South Mahratta, and Konkan Districts of the Bombay Presidency, from the Revenue Survey Map and the Indian Atlas sheets. Government Photozincographic Office, Poona, 1876. Scale 4 miles to 1 inch:—No. 1. Map of the Province of Kandesh. (Completed in the next sheet.) No. 2. Parts of Khandesh, Nasik, Ahmednuggur [Ahmednagar], and Poona. No. 3. Parts of Ahmednuggur [Ahmednagar], Poona, Satara, Sholapoor [Sholapur], &c. No. 4.

Parts of Satara, Kolhapur, Belgaum, Kaladgi, Dharwar, &c. No. 5. Parts of Belgaum, Dharwar, Kanara, &c. No. 6. Parts of Surat, Nasik, Tanna, Poona, &c. No. 7. Parts of Tanna, Poona, Colaba, Satara, Ratnagiri, &c. No. 8. Parts of Ratnagiri, Satara, Kolhapur, &c.—Northern Division. Ahmedabad Collectorate. Map of the Ahmedabad Zilla and the Kaira Zilla, Guzerat. Compiled from the Village Maps of the Guzerat Revenue Survey, 1867. Scale 4 miles to 1 inch. On 2 sheets. Size 44 inches by 36.—Map of the Ahmedabad District, Province Guzerat. Compiled from the Village Maps of the Guzerat Revenue Survey. Scale 2 miles to 1 inch. Part 1. The five Talukas, Prantij [Parantij], Viramgam, Sanand, Daskroi, and Dholka. On 2 sheets. Part 2. Dhandhuka and Gogo talukas. On 1½ sheets.—Taluka Maps of Ahmedabad Collectorate. Scale 2 miles to 1 inch: Daskroi, Dhandhuka, Dholka, Gogo, Prantij [Parantij], and Idar [Edar], Sanand, Viramgam.—Amedabad City. Compiled by Mr. T. A. Le Mcsurrier, Assistant Superintendent Revenue Survey, from the City Survey Maps of the Guzerat Revenue Survey, 1878. Scale 12 chains to 1 inch. Size 15 inches by 12.—Broach Collectorate. Map of the Broach District, Province of Guzerat. Compiled from the Village Maps of the Guzerat Revenue Survey, 1876. Scale 2 miles to 1 inch. Size 40 inches by 27. Taluka Maps of Broach Collectorate. Scale 2 miles to 1 inch: Amod, Ankleswar, Broach, Jambusar, Wagra.—Colaba Collectorate. The Concan, Colaba Division (Collectorate), 1868. Scale 2 miles to 1 inch. Size 40 inches by 27.—Kaira Collectorate. Map of the Kaira District (Collectorate), Province Guzerat. Compiled from the Village Maps of the Guzerat Revenue Survey, 1878. Scale 2 miles to 1 inch. Size 40 inches by 40. Taluka Maps of Kaira Collectorate:—Anand, Borsad, Kapadwanj, Matar, Mehmabad, Nariad, Thasra.—Khandesh Collectorate. Western Portion. Map of the Province (Collectorate) of Khandesh. Commenced in 1852 and completed in 1871. By the Khandesh Revenue Survey. Scale 2 miles to 1 inch. On 4 sheets. Size of each 40 inches by 27.—Eastern Portion. Map of the Province (Collectorate) of Khandesh. Commenced in 1852 and completed in 1871. By the Khandesh Revenue Survey. Scale 2 miles to 1 inch. On 4 sheets. Size of each 40 inches by 27.—Nasik Collectorate. Taluka Maps of Nasik Collectorate:—Baglan (coloured), Chandor, Dindori, Yeola [Sawargaon] (coloured).—Map of the Peith [Peint], State of the Nassik [Nasik] Zilla (Collectorate). Scale 2 miles to 1 inch. Size 22 inches by 18.—Panch Mahals Collectorate. Map of the Panch Mahals District (Collectorate), Province Guzerat. Compiled from the Village Maps of the Guzerat Revenue Survey, 1878. Scale 2 miles to 1 inch. On 2 sheets. Size 40 inches by 44.—Surat Collectorate. Map of the Surat Collectorate, Guzerat Province. Compiled from Village Maps of the Guzerat Revenue Survey. A.D. 1871. Scale 2 miles to 1 inch. Size 40 inches by 50. Taluka Maps of Surat Collectorate:—Balsar [Bulsar], Bardoli, Chikli [Chikhli], Chorasi, Jalalpor, Mandvi, Olpad, Pardi.—Tanna Collectorate. The Concan, Tanna Division (Collectorate), 1868. Scale 2 miles to 1 inch. On 2½ sheets. Size 40 inches by 64. Taluka Maps of Tanna Collectorate:—Bassein, Bhowndy [Bhiwandi], Callian [Kalyan], Dhanoo [Dahanu], Kurjut [Karjat], Mahim, Moorbad [Murbad], coloured, Panwell [Panwel], Salsette, Shahpoor [Shahapur], Wadeh [Wara].—Southern Division. Ahmednagar Collectorate. Map of the Ahmednuggur [Ahmednagar] Collectorate. Compiled from Revenue Survey Talooka [Taluka] Maps, 1872. Scale 3 miles to 1 inch. On 2 sheets. Size 40 inches by 52.—Dharwar Collectorate. Map of the Dharwar Collectorate, 1874. Scale 4 miles to 1 inch. Size 33 inches by 27.—Kaladgi Collectorate. Map of the Kuladgee [Kaladgi] Collectorate. Prepared at the Revenue Survey Office at Dharwar. Scale 4 miles to 1 inch. Size 40 inches by 27.—Map of the Kuladgee [Kaladgi] Collectorate.

Prepared at the Revenue Survey Office at Dharwar. Scale 2 miles to 1 inch. On 4 sheets. Size 66 inches by 48.—Poona Collectorate. Map of the Poona Collectorate. Compiled from the Revenue Survey Taluka Maps, 1876. Scale 2 miles to 1 inch. On 4 sheets. Size 62 inches by 70.—Taluka Maps of Poona Collectorate:—Bhimthadi [Bhimthara], Haveli, Indapoor [Indapur], Junnar, Khed, Mawal, Purandhar, coloured, Shirur [Sirur]. Municipal Towns of Poona Collectorate. Surveyed by Major Tanner, 1878:—Bara-mati, Indapur, Jejuri.—Ratnagiri Collectorate. Map of the surveyed Talooks of the Ratnagiri Collectorate. 1874. Scale 2 miles to 1 inch. Size 31 inches by 47.—Satara Collectorate. Malcolm Pet or Mahahleshwar Bazar, District (Collectorate) Satara. 11th Division, Deccan Topographical Survey. Season 1877–78. Major H. Tanner, Deputy Superintendent of Survey. Scale 66 feet to 1 inch. Size 32 inches by 46.—Sholapur Collectorate. Map of the Sholapores [Sholapur] Collectorate. Compiled from the Revenue Survey Talooka [Taluka] Maps, 1873. Scale 2 miles to 1 inch. On 4 sheets. Size 58 inches by 68.—Taluka Maps of the Sholapur Collectorate:—Barsee [Barsi], Karmale [Karmala], Madeh [Madha], Malsiras, coloured, Pandharpur, Sangole [Sangola], Sholapore [Sholapur].—Map of the Akulkote [Akalkot] State of the Sholapoor [Sholapur] Zilla (Collectorate), 1878. Scale 2 miles to 1 inch. Size 18 inches by 22.—Kattyar Agency. Map of the Gondal State, 1877. Scale 2 miles to 1 inch. Size 40 inches by 40. Coloured.—Sind Division. The Province Division of Sind. (Forest Map. Government Office, Poona, 1877.) Scale 20 miles to 1 inch. Size 24 inches by 19. Indian Atlas:—Quarter Sheets. Sheet 90, S.W. Parts of Mandla, Bilaspur, &c. Central Provinces. Sheet 95, N.E. Point Narsapur, Godavery Delta. Sheet 125, N.W. Parts of Khasi and Garo Hills.—Lower Provinces Revenue Survey. District Dinajpore [Dinagepore]. Scale 1 mile to 1 inch. On 13 sheets. Sheets 10, 12, and 13. Index to the Sheets of District Dinagepore.—Lower Provinces Revenue Survey. Civil Station and Cantonment of Silchar, District Cachar, 1867. Calcutta, 1878. Scale 6 inches to 1 mile.—North-West Provinces Revenue Survey, District Hamirpur, 1878. Scale 1 inch to 1 mile. On 12 sheets. Sheets 9 and 10.—Trigonometrical Branch, Survey of India. Jaunsar Bawar, District Dehra Dun. Scale 2 inches to 1 mile. On 4 sheets. Sheet 3.—Trigonometrical Branch, Survey of India. Kumaun and British Garhwal. Scale 1 inch to 1 mile. On 37 sheets. Sheets 29 and 37, with Hills.—Punjab Revenue Survey. District Rohtak, 1874–1877. Scale 1 inch to 1 mile. On 8 sheets. Preliminary Map and Sheet Index of District Rohtak, 1874–1877. Scale 4 miles to 1 inch.—City and Cantonment of Neemuch. Season 1876–77. Scale 12 inches to 1 mile. On 4 sheets.—Plan of the City and Environs of Jodhpur [Jodhpore], 1877. Scale 6 inches to 1 mile. On 2 sheets.—Ganjam and Orissa Topographical Survey. Scale 2 miles to 1 inch. Seasons 1854–1857 and 1860–1863. Parts of Districts Bilaspur and Sambulpur [Sambalpur], &c., Central Provinces. Sheets 62, 63, 64, and 65. On 1 sheet. Old Series. (See Catalogue 182.)—Central Provinces and Vizagapatam Agency, Topographical Survey. Scale 1 mile to 1 inch. Seasons 1866, 1867, and 1868. Sheet No. 15. New Series. Parts of Jeipur [Jaipur], in Madras; and of Bastar, in the Central Provinces.—Assam. On 9 sheets. Scale 8 miles to 1 inch. Sheet No. 4. Garo Hills, &c.—Great Trigonometrical Survey of India. Revised Index Chart of the Guzerat Topographical Survey, 1879. Trigonometrical Branch, Survey of India. Sheet No. 54 of Kattywar. Parts of Barda, Hallar, and Sorath. Sheet No. 56 of Kattywar. Part of Barda. Index Chart of the Kattywar Topographical Survey. (*Stanford, agent.*)

NOTE.—The names in brackets [] are authorised spellings.

Ujfalvy, Ch. E. de.—Région du Haut-Oxus, par Ch. E. de Ujfalvy. Scale 1:7,500,000 or 102·7 geographical miles to an inch. Société de Géographie, Paris, 1879.

AFRICA.

Berlioux, E. F.—Afrique Centrale. Libya Interior de Ptolémée ou Les anciennes explorations et les prochaines découvertes des régions du Sahara Central. Scale 1:182,000 or 2·4 geographical miles to an inch. E. F. Berlioux, professeur de géographie à Lyon, 1879.

Intelligence Branch, Quartermaster-General's Department.—Military Map of Zulu Land. Scale 1:316,800 or 4·3 geographical miles to an inch. Compiled and lithographed at the Quartermaster-General's Department, under the direction of Captain G. E. Grover, R.E., D.A.Q.G. June 1879. (*Stanford, agent.*)

All the information which has been received with regard to the topography of Zulu Land, and portions of the Transvaal, and Natal, is embodied in this edition of the Military Map of Zulu Land; it also contains an addition to the maps previously published by the Intelligence Branch of the Quartermaster-General's Department, in the sketch survey of the Emlalazi River, made by W. F. Hart, Capt. 31st Regt., Brigade Major, 2 Bde. 1st Div.

— Sketch showing mode of attack on Colonel Wood's camp, March 29th, 1879. Scale 12 inches to 1 mile; by Lieut. H. Lysons, 90th Lt. Infy., Kambula Camp, 1st April, 1879. Lithographed at the Intelligence Branch, Quartermaster-General's Department, 1879. (*Stanford, agent.*)

— Colonel Wood's entrenched camp, Kambula Hill, March 7th, 1879. Scale 155 yards to an inch; from a rough sketch by Colour-Sergeant McAllen, 90th Lt. Infy., Kambula, 9th March, 1879; killed on March 29th. Lithographed at the Intelligence Branch, Quartermaster-General's Department, 1879. (*Stanford, agent.*)

— Zlobani Mountain, attacked 28th March, 1879. Scale 1:42,240 or 1·7 inches to a geographical mile; by H. Lysons, 2nd Lieut. 90th Lt. Infy. Lithographed at the Intelligence Branch, Quartermaster-General's Department, 1879. (*Stanford, agent.*)

AMERICA.

Petermann's 'Geographische Mittheilungen.'—Karte der Halbinsel Yucatan, hauptsächlich nach der von Joachim Hubbe und Andres Aznar Perez, zusammengestellten und von C. Hermann Berendt revidirten und vermehrten Mapa de la Peninsula de Yucatan, von 1878. Scale 1:1,600,000 or 21·7 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879, Tafel 11. Justus Perthes. Gotha, 1879.

U.S. Geological and Geographical Survey of the Territories.—Drainage Map showing a portion of Wyoming, Idaho, and Utah. Scale 1:500,000 or 6·8 geographical miles to an inch. Primary Triangulation by A. D. Wilson; topography by Henry Gannett, G. B. Chittenden, G. R. Bechler, and F. A. Clark; drawing by F. D. Owen. Department of the Interior, U.S. Geological and Geographical Survey of the Territories, F. W. Hayden, U.S. Geologist in charge. 1879.

INDIAN ARCHIPELAGO.

Veth, Prof. P. J.—Map of the Tenimber Islands, after Guyot's General Map of the Assistant Residency, Banda, illustrating the recent discovery of Egeron Strait. Scale 1:1,300,000 or 17·7 geographical miles to an inch. By Professor P. J. Veth. Published for the 'Journal of the Royal Geographical Society.' 1878.

MAP OF SOUTH AFRICA

ILLUSTRATING THE JOURNEY OF MAJOR SERPA PINTO

from

BENGUELLA TO NATAL

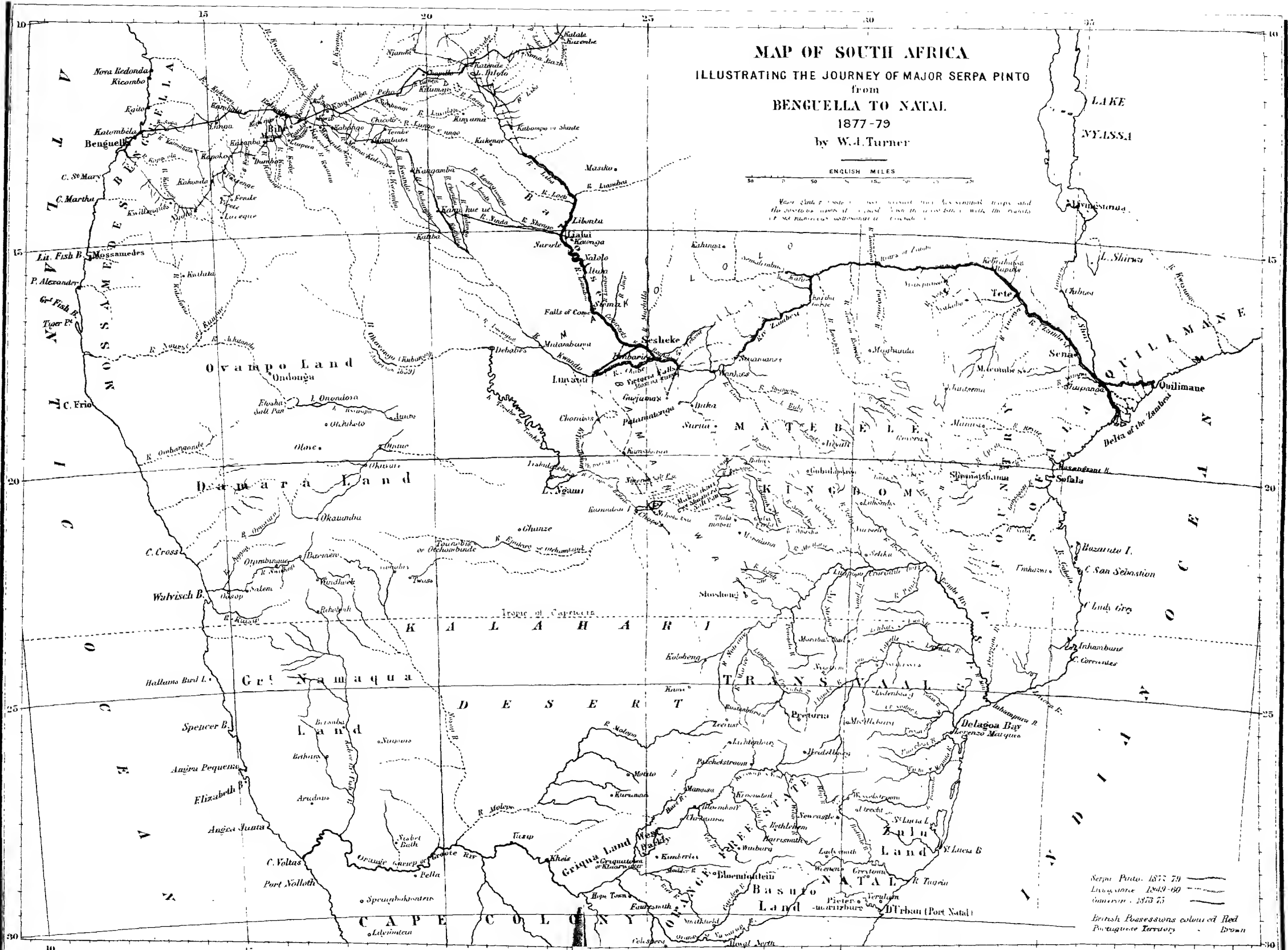
1877-79

by W.J. Turner

ENGLISH MILES

0 10 20 30 40 50 60 70 80 90 100

Major Serpa Pinto's route is shown in black, his command troops and the Portuguese army of 1877-79 in red, and the Portuguese army of 1877-79 in brown.



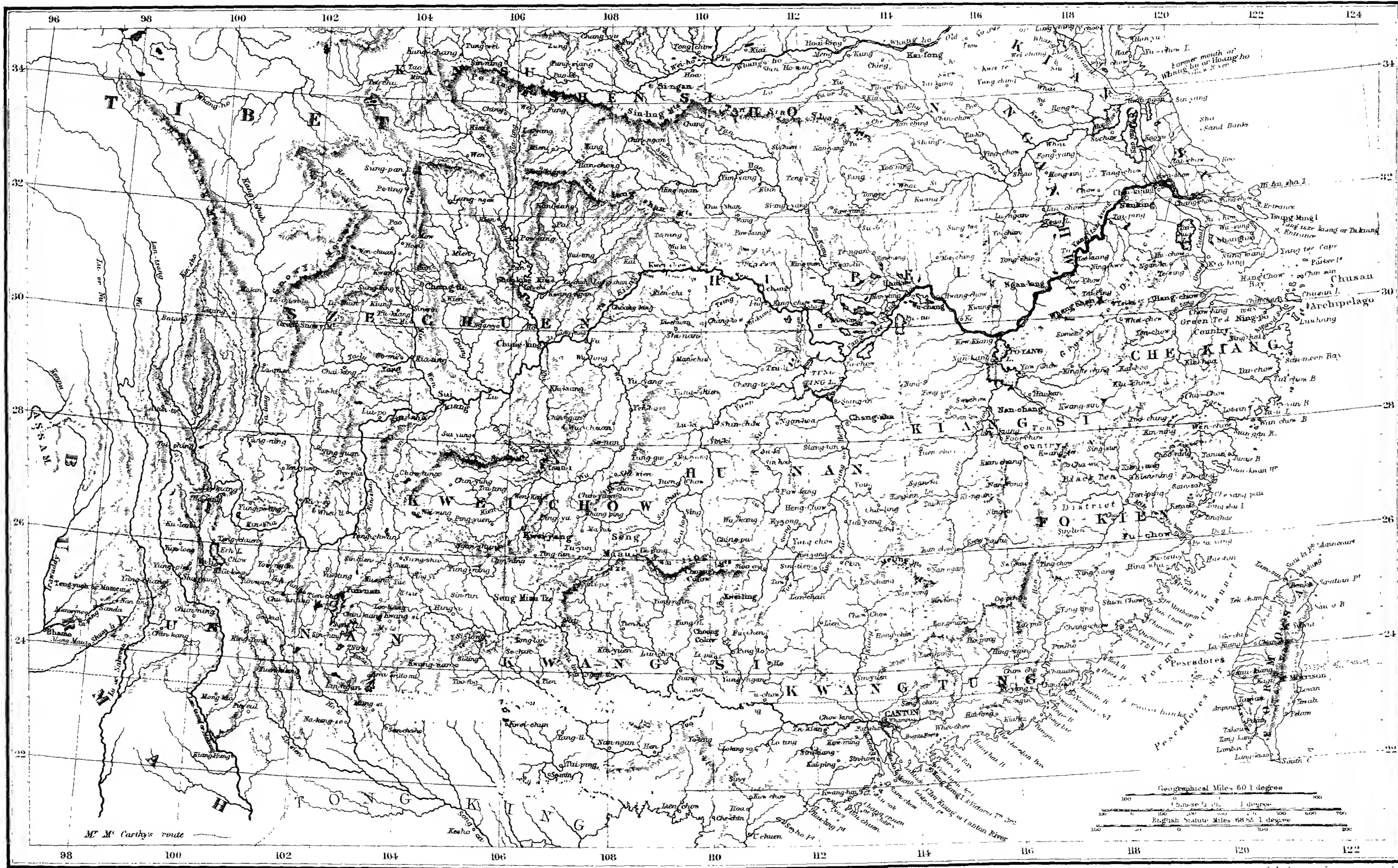
Serpa Pinto, 1877-79

Portuguese, 1849-69

Portuguese, 1877-79

British Possessions colored Red
Portuguese Territory colored Brown

MAP OF CENTRAL & SOUTHERN CHINA, ILLUSTRATING MR MC CARTHY'S JOURNEY FROM CHINKIANG TO BHAMO 1877.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Notes of a Trip from Zanzibar to Usambara, in February and
March, 1879.* By KEITH JOHNSTON.

(Read at the Evening Meeting, June 23rd, 1879.)

Map, p. 616.

THE districts of Usambara which we visited in our preliminary trip have been so recently described in the 'Proceedings of the Royal Geographical Society,' by the Rev. Mr. Farler, of the Universities Mission, whose long residence at Magila has given him an intimate knowledge of its surrounding country, that there remains little or nothing that is new to add to his account. Our attention was, however, more specially directed to the geography of the route; several additional positions and heights were instrumentally determined, so that the accompanying map may prove a useful supplement to his chart. The appended notes on the geology and natural history of these districts, by Mr. Thomson, will be found to give good general ideas on these subjects.

Our native party for Usambara consisted of Chuma and nine men. For rations and payments by the way, we had a small stock of "ulayiti," or English cotton cloth, besides some pieces of broad blue "kaniki" and of red "bandera," along with a few pounds of white beads and some hoes. Four 5-lb. kegs of gunpowder were also taken to give as presents. It is worth noting that the Usambara people stand almost alone now in East Africa in preferring the thin, and comparatively poor and worthless, Manchester cotton, to the strong and durable American cloth which has ousted the British manufacture in all other parts. We found that silver dollars and pice pass current in most parts of Usambara, so that one might travel with these alone; but rupees are rejected excepting on the coast, no doubt on account of their fluctuating value.

The Bay of Pangani is enclosed north and south by two converging edges of the raised terrace which skirts this part of the African coast,

and which run inland in the direction of the river valley, the terrace having evidently been cut through at this point by the action of the stream, and then of the tide ebbing and flowing strongly out and in. The head of the bay is closed by a north and south stretch of sand running from the base of the northern cliff to the mouth of the river, immediately over which rises the southern or Mbweni bluff. Evidently in former times the river has had a branch with main outlet along the base of the northern cliff, the channel it has abandoned being plainly marked there by a depression filled with marshy pools. The low delta land, between, retreats from the sea in parallel wave-like ridges and hollows of sand, covered now with luxuriantly growing coco-nut trees, bordered by a mangrove belt along the sea face, where the tide forms a lagoon at high water.

The town of Pangani lies close to the river mouth, at the south-east corner of the old delta; about a dozen fairly good stone houses belonging to the sultan's governor, the Arabs and Hindi merchants, stand next the river; behind these the native huts are clustered, and reach back into the coco-nut groves.

Boats and outriggered canoes are constantly plying to the opposite side of the river, about 300 yards across in this part of the estuary, to where there is a narrow fringe of houses and huts along the narrow margin. Above rises the Mbweni cliff, which shows red here and there between the masses of green that cover it. The population of Pangani and its surroundings may be about 1000 in all, at a rough estimate.

We had a letter of introduction to the sultan's governor, who formally received us, and gave some information about the trade of Pangani. It is the port of all southern Usambara and of the Uzegua country in the river valley, exporting grain and tobacco, live stock (cattle and goats), and ghee butter, the two latter chiefly from the Rufu Valley. It used to have a large caravan traffic with the Masai country and Kamalondo, on the coast of the Victoria Nyanza, but this has declined very greatly; for the last caravan from Pangani left it a year ago, and has not been heard of since that time.

From Pangani, which we left on the afternoon of Thursday the 27th, our route lay northward, first along the level sands of the head of the bay, then up the steep cliff edge, 50 or 60 feet high on the northern side of the delta. Ascending this, we found ourselves on a level terrace, partly wooded, partly covered with coarse grass, and partly cleared to form rice fields and banana plantations. Before reaching the district of Madanga, two hours from Pangani, we had ascended to a second less definitely marked terrace. The night was passed in the village of Mlulu or Mruru, which is formed within a clearing of a denser part of the woods and jungle which close it in on every side, the only entrance being a narrow gateway between rows of upright posts driven into the ground and overgrown by vegetation so as to be almost concealed. The

huts, about twenty in number, are of irregular oblong form, with rounded ends, and thatched with shaggy straw that hangs down close to the ground, the entrance being so low that one has almost to crawl indoors.

On the 23th we left Mrurn at daybreak, and turned north-westward towards the mountains behind Magila, some of whose peaks began to be visible at intervals. For a few miles our way was still in partially cultivated country, but in less than an hour we emerged on the broad uninhabited wilderness called Nyika, which lies between the coast belt and the base of the inland hills. As far as a chain of pools called Kakindu, about half-way across, the Nyika presents a nearly uniform aspect of gently undulating park-like land, dotted over with small trees, among which the branching ulala, the Hyphane palm, is by far the most frequent and characteristic. Here and there, and especially at the point marked on the map, we came upon little groups of tall *Borassus* palms, with smooth stems contracting, at a height of 50 or 60 feet above ground, like a bottle neck, to throw up a slender pillar carrying the fan leaves of the crest.

The Kakindu pools afford the only potable water on this route across the desert at this season, and we found the supply excellent, though an uninviting green scum covers them. Beyond these the country becomes more undulating, and the branching palms that had been characteristic before, give place to acacia thickets. One large isolated tamarind (mkwaju) beside the path marks the point of divergence of a southern path to the market of Mawia, two hours distant from Pangani.

A few miles further on, the inner border of the wilderness is reached, and we ascend the first rise of the hilly country through woods and bush. A shade tree used as a resting-place, and a fenced well beside it, are the next points reached; these mark the meeting-place of several routes, especially that from Unba in the north and from the Magila district in the north-west. We go on by the latter up hill and down dale, through woods and by cultivated clearings, obtaining occasional backward views across the desert to the blue sea, till we turn aside by a little green lane to the village called Kwa Makumba (or Makumba's residence), which was to be our halting-place. As we entered, some of the villagers were climbing about among the fronds of the coco-nut trees that surround the huts, collecting the tembo or palm wine from the cups hung to receive it. The chief and his second in command, who were evidently partial to tembo, were riding double across a log in the middle of the village, and there they sat all the afternoon and evening.

Near the entrance to Kwa Makumba there is a fine view westward over swelling hills and ridges to the blue mountains; most of the ridges are densely wooded, the white stem of the mparamusi showing out here and there in contrast to the general green.

Our way onward on the morning of the 1st of March was up and down, over these lower hills and the cultivated hollows between, over

the stream of the Mkurumusi and on to where a broad, well-kept path leads up to the mission house and church of Magila, whence there is a fine panorama of the mountains. At Magila we were most hospitably received by the Rev. Mr. Phillips and the Rev. Mr. Johnson, of the Universities Mission. The former of these gentlemen accompanied us in the afternoon up the rocky cliff north-west of Magila, which was ascended by Captain Wharton and Dr. Kirk in 1877, and which was found then to be about 1950 feet high. We reached it after a stiff climb up the wooded valley of the Mkurumuzi torrent, which tumbles down the mountain side in little cascades, passing a small village perched on the shoulder of the mountain not far from the top. The view from the summit of the crag was very fine. From north-east to south-west the horizon was closed in by the dark, forest-covered mountains behind us, reaching round from the summit called Kiturwe to the long barrier that terminates in a slope called Kiamahondo, a short distance from the Bufu. The dark peak of Tongwe stood up prominently in the undulating country southward; and nearer lay the grassy hills that our guide called Serengala. South-eastward the distant bluff of Pangani was distinctly seen, and eastward the broad inlet of Tanga; while between these the level of the Nyika wilderness was distinctly marked off from the undulating Bondei country at our feet, dotted with villages and cultivated tracts.*

This moon in the Magila district is that of the "Mvua ya mwaka," the rain of the year, which precedes the three months of the "Masika," or rainy season, that lasts till the end of May. The beginning of this moon is the great sowing time, and the rice, the most universal crop, is just showing its tender green shoots above ground. The showers which come again from the north in November are also called the "Mvua ya mwaka," and then there is a lesser planting time.

We left Magila on the morning of the 3rd, when the sun was just beginning to light up the tops of the mountains, leaving the valleys still in shade, and made our way westward to turn the southern corner of the Magila Range. Rounding this corner, we opened a fine view of the broad basin which lies between the two outer mountain ranges, and went on across it by a regular alternation of wooded ridges and cleared hollows, with plots of bananas, cassava or mhogo, or rice, in each of which a few natives were at work.

Approaching the other side of the basin, we crossed a streamlet called

* On beginning to fill the barometer which I had brought up-hill, I was much grieved to find that the tube was broken across just above the cistern. The same accident happened to a George barometer of the same pattern (the one in which the cistern is rigidly screwed to the tube) in South America. This instrument was in perfect order in Zanzibar, and was carried wrapped in bedding; yet, notwithstanding this and its triple covering of rubber, brass, and wood, the weight of the empty cistern had snapped the tube in some jar that it had received. I have always preferred the rubber stops to the rigid screw, and fortunately have a spare one of that pattern.

the Tango zani Kara, and then ascended a steep wooded hill. At the top of this we reached a circular clearing where a busy and noisy vegetable market was going on, the buyers and sellers, two or three hundred in number, being almost all women. This spot marks the boundary of the Bondei country as distinguished from Usambara proper.

From this a steep descent brings us to the clear stream of the Kihuhui, a tributary of the Zigi, and hence we obtain a fine view of the peaks of Mringa. Then follows a long climb through the forest and corresponding descent by wet, slippery wood-path to the Zigi, which was reached at eleven o'clock. The scene from this crossing of the Zigi is very fine: dark wooded mountains rise up from the valley on all sides, the stream is overhung by the richest vegetation, and bordered by ferns * along its banks, and flows now rapidly over its boulders, now quietly in deeper pools. It is crossed where an islet divides it into two branches, each of which is bridged by a great mvuli tree thrown over it. In one of the pools below the crossing, we came upon an artificial dam in which several fish-traps, of exactly the same pattern as those used in the Thames, were set. We rested on the island in the Zigi, and had a number of visitors: one old man demanded a present, as he said he was headman of all these parts; but his cravings were quite satisfied with an empty meat tin, which we left him polishing in the river. At two o'clock we left the Zigi and climbed up through the forest along the slope of the glen in which the river flows, passing several little torrents, till the village of Kodongo was reached. From this point we had a magnificent view down the glen eastward, and across the valley to the mountains of Magila: westward the forest-covered slopes that we had still to climb rose steeply above us. From Kodongo the path lay straight up the mountain side, and for an hour we were climbing wearily one above another. So steep is this ascent, that in wet weather when the soil becomes slippery the natives can neither go up nor down. At length the summit was gained, and turning north-eastward along the grassy top of the mountain, we came to the first gate of Msasa, where our guide fired off his flint gun two or three times to announce our arrival. Passing through this, and a second stockaded gateway, we found ourselves on the open summit on which the village stands. Msasa consists of about twenty circular huts with conical bee-hive roofs that reach almost to the ground, a low semicircular opening being cut opposite the doorway. The chief of this hill fort is Abdullah, an Arab, who for some reason found it best to leave Zanzibar and to seek retirement in these mountains. There he soon gained a position, for he is by far the most able man of any of the chiefs of this section of Usambara, and Kibanga of Handei is said to be almost completely under his control.

Looking west and north-west from Msasa the view extends over a

* One of these resembled a giant Scolopendrium, but had small seeds dotted over the reverse of the leaf.

wide basin, enclosing several minor ridges and valleys, to the long high range of Handei which bounds the horizon. All this area is so densely covered with dark tree-tops, that not a spot of open ground is to be seen except on the very summits of one or two of the highest of the distant hills. North-east and south-west, the prospect is closed in by mountains somewhat higher than this of Msasa, but to east and south-east it extends down the valley of the Zigi and past the mountains of Magila to the plain beyond, in the direction of Pangani. The boiling-point of two thermometers was $206\cdot9^{\circ}$, so that the elevation of Msasa is about 2900 feet above the sea. Our men complained bitterly of the cold, and kept up fires all night, though to us the night air was only refreshingly cool. Here, as at Magila, the night sky was covered with heavy clouds which rolling up from north-eastward made observation for latitude impossible.

At daybreak on the 4th the valleys beneath us were still shrouded in mist, and this had not altogether cleared off when we began the descent into the dark forest on our way to Handei an hour later. The whole of this day's march was through such dense forest that we scarcely saw the sun. The path wound through short underwood of shrubs of great variety, among the tall, straight tree trunks, across the ridges which run parallel to the main lines of the mountains. The first considerable stream we crossed was that of the Pempunga; the next the Pemkuyu, a much larger stream, and the main upper tributary of the Zigi. It is crossed where a number of large gneiss blocks have fallen across it, and from there the vista along its banks, overshadowed by tall trees hung with creepers, was very beautiful. Here by the river bank we noticed for the first time several groups of exquisite tree ferns growing to about 15 feet in height, as well as the spreading miali, or mwale palm, whose great fronds seem to grow directly from the ground. The midribs of its huge leaves are laid together to form hut doors almost universally in Usambara.

At noon the outer gate of Ngambo, the present capital of Handei, was reached, and more gun-firing gave notice of our approach. The chief Kibanga had been informed by messengers of our intended coming, and so his men were ready to salute us as we passed between the huts with a volley of musketry, but the flint guns were so crammed with powder, and were fired from the knee in such a promiscuous way, the men dancing and shouting at the same time, that we were very thankful when the noisy welcome was over.

The village of Ngambo was the most considerable we had yet seen in Usambara, consisting of about forty large circular or oval huts. A circle of these placed at the inner end of the village and shut in by a palisade forms the chief's quarters and the residences of some of his many wives. All round the village, excepting the gateways, a dense jungle, which would be most difficult to penetrate, makes an efficient fortifica-

tion, and outside this a second barrier is formed by felled trees and deep trenches. The gateways are in walls of posts driven into the ground so as to form a mass quite 6 feet thick, which reach into the jungle on each side, and each narrow gate has two doors formed of heavy single slabs of timber.

When we were settled in the hut assigned to us, Kibanga came to pay a formal visit. He is brother to the present king of Fuga, but is constantly at war with him; the story of the political troubles and divisions of Usambara since the death of the former Kimweri has been given by Bishop Steere in Sir Bartle Frere's 'Eastern Africa' (p. 35), as well as by Mr. Farler in his recent paper, so that it need not be repeated here.

Kibanga's features differ from those of any of his attendant villagers, and indeed from those of any Usambara man we had seen. His skin is of much lighter shade, and his peculiarly curved nose, deep sunk eyes, lined forehead and small ears, reminded one much of the portraits of Theodore of Abyssinia. I could not find that he had any tradition of the origin of his people, except that at first their mothers were Uzegua women.

Our conversation, carried on through Chuma, drifted quickly into the subject of the geography of the district under Kibanga's rule, which extends nominally from the Pemkuyu westward to the valley beyond the mountains of Handei, south to near the Rufu and northward two days' journey.

The interview over, Kibanga retired, and presently sent us a sheep and some fowls, providing also a quantity of rice for the men. The return present consisted of several cloths of various kinds, a keg of powder, several hoes, and a kofia and kanzu, or worked cap and long garment, with all of which he expressed himself well satisfied.

During all the evening and well into the night we were entertained by dances. These were begun by the children of the village, boys and girls forming two opposite lines, the one side repeating a monotonous chant of "Ngambo-yambo," the other replying "Oi, oi," and keeping this up throughout the dance. This was begun by one of the girls shuffling across the space between the lines, feet together, by a peculiar jerking of the body, choosing a boy partner, and shuffling back with him in a sort of waltz, in which arms were changed at each step. This was followed by a furious sort of war-dance by the young men, who ran round in a circle, shouting and clapping hands in time, two opposite in the ring darting into it at intervals, and after dodging one another about returning to the rapidly moving ring.

The night closed in dark and cloudy, so that the much desired observation for latitude seemed hopeless, but about three o'clock we were awakened simultaneously by the invasion of the hut, under the eaves of which we were sleeping, by myriads of sharp-biting ants, which covered roof and floor, and walls, and posts, and literally rained upon us. Escaping from the hut, I found that several stars were visible, and

so occupied the time during which the ants were being driven from our habitation by means of fires lit round it, in getting a latitude of Ngambo.

On the 5th, accompanied by Abdullah of Msasa, who had come over with us, I climbed the hill of Handei, the top of which is about 2 miles direct distance north-west of Ngambo. The boiling-point thermometer had shown 206.6° at the village, or an elevation of about 3100 feet. The hill was quite 900 feet higher, or about 4000 feet above the sea. Gradually, as we ascended, the clouds that were sweeping from the north-east lifted: the view from the summit was magnificent, and disclosed features of which I had no previous conception.

Immediately beneath us lay a great valley, 5 or 6 miles wide, extending from N.N.E. to S.S.W.; bordered on this side by the mountains of Handei, which fall almost precipitously down into it; on the other by the sharp-cut edge of what may be called the plateau of Fuga, over which, range upon range of mountains filled up all the western horizon. The bed of the valley seemed almost level, except where a little green hill ridge called Churui rose in the middle. On this side a river named the Muremwa meanders down to the Rufu, and at the base of the opposite mountains the larger Ruengera follows a parallel course, coming down from the western plateau through a gorge into the plain. Northward the valley was divided into two upper branches by the peak of Rutindi, on the flank of which we could see the huts of the village of Hundu, where the chief Kinyassi resides. The western branch, along which we had a distinct view, was closed at its termination by very high and apparently isolated mountains. Their names were given me by Abdullah, who knows all this country very thoroughly. The most northerly are Yamba (352° to 355° true), and Gombero, a flat-topped steep-sided mountain (351°); both of these belong to the district of a chief named Shatu. Kongoi is a very distant flat-topped mountain (348° 30'), beyond which all is said to be plain country. The Bumbuli Hills in which the Ruengera rises centre about 324° 30'; Baga, the furthest mountains we can see over the northern part of the plateau, extend from 315° to 317° ; next the rounded dome mountain, on which Fuga stands, was distinctly seen, and appeared to be about 25 miles off in direct distance, though it is two days' march from Ngambo by path; its bearing from this is 304° true. A large swampy lake in the mouth of the western branch of the valley, between Rutindi and the gorge from which the Ruengera issues, is named Kumba; it is not connected with any river. Along the opposite slope of the mountains Abdullah pointed out in succession the village of Sembakeza (chief Mwakimungu), which lies on the track to Fuga; Tamota (chief Kihyo), where there is another pass up from the valley; the Murungui Valley (chief Mandia), Muraro (chief Sindano), and Vugiri (chief Joho). As far as I could understand the accounts given, the most important river beyond the Ruengera is the Mkomazi,

which goes from near Masinde (Semboja's town near and beneath Fuga) to the Rufu, having for tributaries the Mwasha, the Kosoi, and the Zumui, the two latter being passed, I believe, on the way to Fuga from Handei.

The broad lowland or valley beneath us is named Sediya. It was formerly very populous, but since the wars of the succession to the throne of Fuga, its villages have been destroyed, and it is now uninhabited, no one on this side venturing towards the Fuga Hills, and no one coming thence except at risk of life. The Masai have made it an easy line of descent in their raids on the cattle of pastoral Uzegua; their bands come by the base of the Gombero Mountain, and pass along the western side of the valley to the plains of the Rufu.

South-eastward in the opening of the valley mouth appear the wide levels of Uzegua, bordered in the west by a chain of isolated conical hills, one of the nearer and more prominent of which, called Mbwego, bears 224° . Along the line of the Handei Mountains, besides the high point upon which we were standing, the most prominent points visible northward along it were the rounded domes of Pemba and Kiranga, and to southward the green grassy peak of Sangarawe rising out of the dark forest, and that of Ubiri a little more distant. Pemkuyu rises behind Pemba Hill, and Zigi in that of Sangarawe. Looking eastward, we could trace their valleys between the dark forest ridges till they unite not far from Msasa. Over the ridge on which Msasa stands (and which seemed low from this elevation), a wide stretch of the maritime plain was visible, as well as the distant bluff of Pangani.

It is remarkable that the great forest of Usambara seems to be confined to the high basin enclosed by the triangular block of mountains between Msasa and Handei. Though the Magila Range and the country all down to the verge of the wilderness is well wooded, the trees are comparatively small; the Sediya Valley, on the other side, has patches of wood only, the rest being open grass-land; and the mountains of what I have called the Fuga plateau, seem to be almost bare, though Captain Speke mentions "prodigious wooding" on the hills south-west of Fuga.

In returning from Handei, we chose the path by the district of Bulwa (I could not find that there had ever been any town of this name), which crosses the range on which Msasa stands, but at a more northerly and much higher point. Abdullah was again our guide, this time an unwilling one, as he had hoped we would return by his own village. The path led back into the great forest; first down into the valley of the Pemkuyu, which was crossed by a picturesque but difficult bridge of a single tree thrown across its rocky bed at a considerable height; and thence over another forest-covered ridge to the channel of its tributary, the Vungue, which is the boundary stream between the districts of Handei and Bulwa. From the Vungue we began

the steep ascent of the range across which Bulwa extends, and after an exceedingly steep climb for an hour up through the forest, reached an overhanging rock called Mavumi, which is used as a resting-place.

Some of the great trees we had passed in the ascent were giants of 8 to 10 feet in diameter above the converging point of the broad, flat, perpendicular buttresses which support their base; they rise often 60 to 70 feet clear without a branch, and their whole height is not less than 150 to 200 feet. The underwood is generally short, the ground often clear and strewed with a matting of dead leaves; the branches above interlace so closely as to exclude the sunlight, and produce a dim, subdued light between the great pillar-like stems.

Another steep climb of half an hour up a rough torrent-bed brought us to the forest-covered summit, which is probably about 4500 feet above sea-level.

In descending the opposite slope, so steep in some parts that one had to hold on by the hanging lianas to prevent sliding down headlong, we had momentary glimpses through the trees of the sharp rock-peaks of Mringa, at the northern end of the Magila Range, and of the fine valley of the Zigi between. After an hour of steep and rapid descent, we came to the first hill village of the Bulwa district on this side; and at noon, after another hour steadily down-hill, passing several more hamlets, we reached the village of Zimbiri in the valley, a place of about sixteen huts, more ragged and unequal in appearance than those of Handei. The prospect from this point was very fine; east were the sharp points of Mringa rising above the wooded slopes; westward the dark mountain, down which we had come, seemed to overhang the valley; while northward the view opened out across a wider valley to the grand range of mountains in which Rukindo, Sengoma, and Mtae are the most conspicuous points.

At three o'clock we left Zimbiri, bidding good-bye to Abdullah of Msasa, who was rendered happy by the present of a keg of powder, and descending eastward reached the Zigi again. Here it had grown into a fine river; where we crossed, it forms four branches, each of them large streams with islands between. Above, where we turned to follow up its right bank for some distance, it was one united river, almost as broad and deep as the Thames at Oxford in its normal condition. Beyond the Zigi the old chief of Zimbiri, who had offered himself as our guide, became confused as to the paths, so we turned back to the village of Rufinga, the gate of which we had passed shortly before, and there found quarters for the night. On entering the narrow gateway, and passing up the narrow path beyond, we found this a very clean, well-built village of about twenty huts, surrounded on all sides by jungle, above which we could see the steep sides of Mringa. Though the moon rose clear over the hills, the night clouded over, and all attempts to obtain a latitude were vain. Sleeping outside, our rest was interrupted first by

the wailing of one of the village dogs, as it was carried off into the jungle, no doubt by a leopard, and afterwards by heavy rain.

On the morning of the 7th we started early, with a fresh guide, in the direction of the path to Magila; and after skirting the hills on the eastern side of the valley, passing the base of the fine projecting cliff of Rugamba, and winding southward over wooded ridges and by cultivated plots for two hours, reached the path we had formerly traversed on our way from Magila to Msasa. Following the old path, Magila was reached again at ten o'clock.

During our halts at Magila, the incessant drumming at one or other of the surrounding villages made one curious to see this monotonous instrument. It consists of a hollow cylinder of wood about two feet long, narrower at one end than the other, ornamented by flat panels, the ends (the larger about one foot in diameter) being closed by skin tightly pegged over them.

It is beaten to one monotonous measure for the dance; to announce war from village to village the beat increases from slow to very fast, and is accompanied by the cry of "Kondo" (war); and a third measure is used in driving out a "pepo" or devil that is supposed to have taken possession of some unfortunate. The drum is then beat close beside the invalid; the idea being that the spirit is so fond of music, that he will come out of the possessed one to hear the drum better; when this is supposed to have taken place, the drum is passed on to a second performer, and then to a third, and so on, till the poor devil gets lost, forgets where he came from, and so the patient is freed.

A small clarinet called the "zomali" about 18 inches long and with a reed mouth-piece is also a favourite instrument; it gives out sounds much resembling those of the Welsh bagpipe without the drone, and accords well with the highland landscape. A third is a double-stringed lute, called the "pangu" or "zeze," in which half a calabash serves as sounding board. The "kwacha" is a shield-like board, about 2 feet long and 8 inches wide, rounded at the ends, into which two round notched sticks of hard wood are inserted so as to form a curve over it; these notched sticks are then rubbed up and down with small sticks, so as to produce a rasping and most unmusical sound. A more capable instrument is the "viringa," a large, rude, piano-like contrivance formed of two thick banana stems laid parallel, and of pieces of hard wood fastened crosswise between these, made so that those giving the highest notes are in the middle, the lower to each side. It is played upon by striking the notes with two sticks.

Besides the marriage custom related by Mr. Farler, a few others that were gathered at Magila may be noted. After birth a child is kept indoors strictly for five days; girls never touch fowl till after marriage, when the husband cooks a chicken and shares it with his wife. Circumcision is generally performed at the age of three or four. Tribal marking

feasts take place at irregular intervals, and there is no special age at which this ceremony is performed. It is accomplished in some tribes by lancing a certain number of marks on the upper arm, when the operation is called the "ndege," because the subject being blindfolded is supposed to be lanced by the beak of a bird or "ndege" which comes to him; the real operator being the village medicine man. In others, as at Handei, the marks are burned into the skin so as to leave a certain number of rounded lumps, four to eighteen marks perhaps being used by the different tribes. These marking days are concluded by a dance, in which kilts of mbuyu, or baobab-bark fibre, are worn, the face and body being sprinkled with white ashes, and a zebra's tail stuck into the belt of the kilt behind, and waved about by a peculiar movement of the body.

When anyone is about to die the drums are brought to the bedside by the men, and women gather into the hut to be ready to weep at the proper time. After death the body is washed and covered with a cloth, and then at a signal given on a drum, a general wailing and drumming begins. The grave is dug about 4 feet deep, and after that a lateral hollow of sufficient size is scooped out, and the body being placed in this is shut into this side cave by a board and the grave is then filled in. Indian corn is then spread on the grave, a custom which may have arisen from the notion that on a man's death the corn he has planted and grown belongs to no one. On the death of a Mohammedan an animal is sacrificed, and prayers are addressed first to God asking him to receive back his creature, and then to the defunct adjuring him not to come back to fight with anyone in a dream.

From Magila we made our way on the morning of the 10th eastward to Umba, where the Universities Mission has another station. We were preceded by the Rev. Mr. Yorke, who had been staying at Magila for a few days, and who, assisted at present by Mr. Woodward, is in charge of the station. Our way led across the hilly and undulating Bondei country, across the Mkurumuzi, past a number of villages, the chief of which were Maveta and Mlembule, and by many large cultivated clearings, to the winding, half-dry bed of the Ukumbine, and from that to the large village of Umba enclosed in the woods which border the wilderness.

The Ukumbine comes from near the Kilima Kiguruni, which we had passed on our way to Magila; it had dried up at the time of our visit to a chain of saline pools rendered so no doubt from the passage of the water over some beds of deposited salts; yet from these the only water supply of the town of Umba and of the surrounding district is obtained.

The town is a strong place entered by two approaches, each guarded by triple gates made from the wood of a species of acacia called m'kongolo, black within and white without, which is so hard as to almost withstand the attacks of the white ants; on other sides it is

protected by a dense jungle. It has not yet been attacked by the plundering Wadigo, whose bands are the scourge of the settled people on the borders of the Nyika, but several villages in its close vicinity, among them the large one of Vumba, have been abandoned within recent months on account of the attacks of these raiders.

The mission station, on entering which we had a most enthusiastic reception by Mr. Yorke's boys, lies in a little clearing of the jungle behind the town, shut off from it by a gateway, and consists of one or two huts only, the church being placed in the middle of the town itself.

From a height outside the gate of Umba I was glad to obtain a number of cross bearings, which enabled me to fix the position of several points of the Magila Range, of the Rukindo Heights, of Bamba Hill, where plumbago is abundant, and of the now distant peak of Rutindi, which we had seen from the hill of Handei, &c.; and an observation for latitude was obtained in the evening.

As we were about to turn in for the night in one of the mission houses a loud roar was heard outside in the jungle, and on going out it was heard again several times more distinctly; Mr. Yorke and some of the natives recognising the sound as the growl of a lion. This was the only wild animal we had heard on the journey; indeed, the scarcity of game in all this district struck us as remarkable.

In returning from Umba our way led south-westward over the undulations and cultivated hollows of the Bondei country, to where we rejoined our old track at the fenced well and tree which had served as our former resting-place. The meeting-point of the paths was crowded to-day with men and women bearing burdens of fresh and dried bananas, rice, cassava, tobacco, &c., on their way to market at Mawia, near Pangani. The men were all armed in some way, either with spears or, most frequently, with bow and short poisoned arrows, tipped either with iron, in various shapes, or with hard wood, and feathered. All the way across the desert to where the track to Mawia branches off from that we followed, our party was mixed up in a long procession of these Bondei and hill people.

A few notes on some of the chief cultivated and wild vegetable products of this part of Usambara may be useful. The most populous and the only extensively cultivated districts through which we passed were those of the Bondei or valley country, between the inner edge of the wilderness and the base of the forest-covered mountains, including in this the broad valley of the Zigi between Bulwa and Magila. Almost every part of this belt is dotted with villages and patched over with plots of cultivated ground, which lie chiefly in the hollows between the wooded ridges. The common products are rice, mhogo or cassava, maize, and sugarcane; tobacco is cultivated here also to some extent, but seems to be the special product of the Handei district, whence considerable quantities of the sun-dried leaf, beaten into little round flat cakes about

2 inches in diameter, are sent down to Pangani for export. The tobacco is coarse and strong, but of fairly good flavour.

Native cotton is used for thread-making to a small extent, but the staple is short and the quality inferior. The "mbungu" (*Candolphia*) vine is known from Pangani inland all the way to Handei, and at Magila I obtained from Mr. Phillips a ball of indiarubber which is made there to a small extent for export. The mbungu fruit was only about half grown at the time of our visit. The gum-copal tree (called shakasi here) is said to be abundant in the woods adjoining the inner side of the wilderness, though I did not notice it, but it does not extend further inland.

Oil-palm trees, or "mchikichi," were noticed at wide intervals as far as Magila, where there is a tall one immediately below the hill on which the mission house stands. The east coast variety of this palm differs in nothing from that of the west excepting in the smaller size of the kernels; but on Pemba Island the trees are numerous enough to make these plums a considerable article of export. From the tree at Magila the owner makes oil for cooking and lighting. The coco-nut seems to cease with the first outlying range of mountains, or as soon as the sea-breeze is shut off; but beyond that the banana becomes very abundant, and its unripe fruit, boiled and threaded on the twigs of bushes to dry in the sun, forms the staple food of the highlanders. Thus prepared, the banana acquires a flavour very like that of the potato.

After a day's delay at Pangani, we were obliged to be content with a very small and filthy dhow to carry us back to Zanzibar.

Notes on the Geology of Usambara. By J. THOMSON.

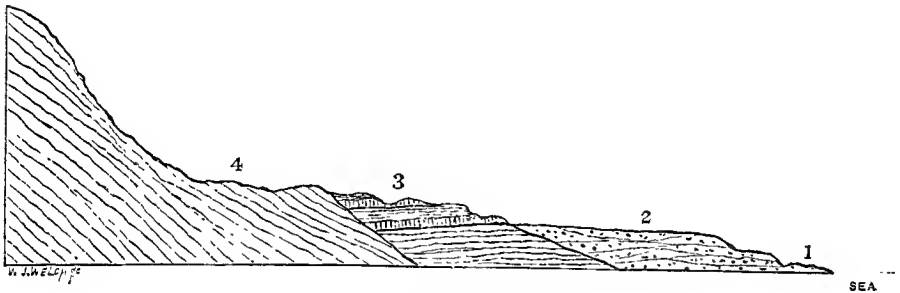
LYING, as our route did, across grass-covered plains, and over forest-clad mountains, it may be well understood that our insight into the internal structure of the country consisted but of glimpses, yet I am convinced that they are sufficient to convey a general idea of the geology, and in that belief submit the following remarks.

The following formations came under our notice:—(1) Recent—alluvium of the Pangani; (2) Tertiary—two raised sea beaches; (3) Carboniferous—sandstones and limestones; and (4) Metamorphic—gneiss.

Taking these in the above order, we have then, in the first place, to consider the recent deposits. The alluvium borne down by the Pangani has in process of time raised a long triangular piece of swampy ground on the north or left side of the river. At its broadest part it will be about three-quarters of a mile, and in length about two miles. The sea has at the same time been busy, adding bank after bank of sand, until a large portion has been added to the alluvium slightly raised

above high-water mark, and upon which the town of Pangani is now situated. The mode of formation of this part, in a succession of banks, thrown up by the sea, has given it a curious surface appearance, viz. that of a series of long, parallel undulations. I have little doubt that this alluvial ground owed its origin to two branches of this river, one of which is now closed; in other words, that it is an old delta.

The last elevatory movements in the upheaval of the African coast have produced two old sea-beaches, which form a very marked feature in the coast scenery. The first, and newer in point of age, occupies a comparatively narrow strip of the sea-coast. It rises from about 20 feet in height along the sea-line to 50 or 60 feet inland, and consists of consolidated coral sand, with shells and loose sand. The former is used as the building material for the stone houses of the town. A coral breccia or conglomerate also forms part of the contents of this beach.



SECTION OF USAMBARA.

1. Recent Formations. 2. Tertiary Deposits. 3. Carboniferous. 4. Gneiss.

The second and more important raised beach rises from 100 feet to 150 or more, further inland. In many places it attains a breadth of at least 12 miles, forming the greater part of an almost level plain called the Wilderness. Lithologically it agrees generally with the first beach; the sands are yellowish and markedly stratified. A red clay also occurs which deserves a word of special notice. It occurs along the whole of the coast country, from at least Mombas to Bagamoyo, and extending inland to the mountains. It forms the soil of this tract of country. It is derived from the decomposition of the gneiss, and it was found that it varied according to the constituents of the gneiss, becoming very arenaceous where quartz was an abundant constituent and argillaceous where felspar predominated. At a place some distance north of Magila, it would appear that the colouring matter disappears, as the clay there is reported to be white. The red clay occurs in the island of Zanzibar, to which it would appear to have been drifted by some current. It contains no fossils. The island of Zanzibar, I believe, is contemporaneous in elevation with this second raised beach.

On leaving the broad level plain which originally formed part of the

sea-bed, we pass on to ground possessing surface features which at once stamp it as belonging to an older state of things—sufficiently old to allow time for the denuding forces to cut the surface into little hills and dales, and uneven mounds. At the same time there is a gradual rise inland. Towards the interior the ground is marked by the disappearance of the loose sands of the Tertiary beach and the appearance of a series of coarse, gritty, reddish sandstones, not unlike many of the beds belonging to the millstone grit of England, or the calciferous series of Scotland. Accompanying the sandstone, two beds of brownish-grey, compact, limestone were observed, both rapidly passing into the crystalline state. The contained fossils, such as corals and marine shells, were as far as seen, in too imperfect a state of preservation to be recognisable, and my short search did not enable me to secure any specimens capable of determination, although I have no doubt that a more careful examination will bring to light many good fossils. The beds lie horizontally. Lithologically the sandstones agree with those described by Thornton at Mombas, and by various travellers at different places to the south—on the Kingani, Lufigi, and Rovuma, and which have been described by Livingstone and Thornton as being identical with the coal-bearing strata of the Zambesi. We have apparently then a band of so-called carboniferous strata, extending from Mombas or further, along the whole east coast to the Zambesi, and probably on to the Cape. Whether the limestones have the same geographical extension, remains as yet to be seen. They, however, reach Mombas, as my friend, Mr. Wakefield, showed me a piece of limestone from that place which, he says, occurs abundantly.

We now come to the Metamorphic series, which makes its appearance at Umba, about 16 miles from the coast. For about 8 miles the ground preserves much the same appearance as described above, only more uneven. On reaching Magila it abruptly rises into a series of mountain ranges. The rock representing this class is a gneiss of a very variable character, whether it relates to the relative abundance or size of its constituents or the presence or absence of the same. It may, however, be described as a garnetiferous gneiss, with mica frequently replaced by hornblende, and in some places considerable quantities of graphite disseminated through the mass of the rock. It is arranged in layers in a very marked manner; when looked at in section it has more resemblance to a sandstone than a metamorphosed rock. The dip of the rock is uniformly east, never high, and showing none of the crumpling so common in gneiss. In the stream which runs down from the mountains behind Magila, I observed some very coarse blocks of metamorphosed conglomerate, evidently brought down from some outcrop of a bed of that character further up the hill. I however did not see the rock *in situ*.

From these glimpses into the internal structure of the country,

I infer that Usambara was originally raised from the ocean as a plateau, the top of which reached above the level of the present mountains, which are simply the result of a long period of denudation, acting to a marked extent in the general line of the strike of the rock, as a glance at the map will show; all the main branches of the Pangani and the Zigi taking their direction in accordance approximately with the strike.

This great elevation has taken place previous to the deposition of the Carboniferous series, which, as has already been noticed, lie horizontally. Any movement that has since taken place must have been of such a wide and general nature as not to disturb this horizontality.

Notes on the Fauna.—In travelling from Pangani to Handei one of the most noticeable features is the seeming scarcity of animal life. Insects and mammals are alike seldom seen, and birds, though by far the best represented class, are concentrated at two points. Accustomed as we are to associate with the tropics a profusion of insect life, one cannot fail to be struck with surprise to find that in a fortnight's march only five species of large butterflies, ten of beetles, and as many dragon-flies were noticed, and even these were far from numerous in individuals. Even mosquitoes—that pest of the tropics—were so scarce as not to be at all troublesome at night. Flies were also scarce, and the hornet tribe was chiefly represented by the mason wasp, which was met with everywhere. Ants were excessively common, requiring the traveller to be continually on the watch. At Handei we were driven out of the hut one night by an invasion. The ant-lion was found, with its funnel-shaped hole, frequently in dry, sandy places, ready to seize the unwary ant which should unfortunately fall into its hole. Grylli are also numerous, filling the night air with their extraordinary sounds. Millipedes, 6 to 8 inches in length, continually meet the eye amongst the bushes. Occasionally a centipede or a scorpion is seen. Among land shells, the large *Achatina* is the only genus which occurs at all abundantly. Three species were observed, all differing from the common Zanzibar form. One occurred at Pangani, a second at Magila, and the third at Handei. A peculiar interest is attached to this shell from the marvellous powers which the natives imagine it to possess of warding off all forms of evil and witchcraft. For this reason the natives of Usambara hold it in high repute, placing the dead shells in little enclosures of stone in their fields, and at the gateways of their villages, which are thus considered to be made safe from the attacks of an enemy or disease.

Lizards are somewhat numerous, especially on trees and in the thatch of the negro huts. None of them boast of fancy colours, being generally striped longitudinally a dull yellow and brown. With the exception of the Gecko, all those seen belong to the Lacertidæ, varying in size from 4 to 8 inches in length, except a monster seen at Magila, which would be about 5 feet in length.

The fact that serpents are rare is demonstrated by our walk, in which only one small green individual was seen, although I was constantly in places where they might have been expected. It is well known, however, that there are a number of both poisonous and non-poisonous snakes. Now and then well-authenticated cases occur of death ensuing, even in a few hours, from bites, but the majority of poisonous bites are not deadly.

Turning now to the feathered tribes, we find them somewhat more numerous, both in species and individuals. This, however, only applies to two places on our line of march—the cultivated country round Pangani, and the same round Magila, while between lay the great stretch of the uninhabited wilderness, in which the sight of a bird was exceptional. Such as were seen comprised a lark, which had a habit of following us some distance, alternately rising straight up, then allowing itself to fall, accompanied with a peculiar whirr from the motion of the wings. A small pigeon, a hawk, a kite, and a jay finish the list. Again, in the magnificent forest around Msasa and Handei, nature seems to have exhausted all her energies in the vegetable world, for not a bird was to be seen, as indeed may be said of all the other classes of animals. Occasionally the curious sounds of the cicadæ, the croaking of a frog, or the harsh half bark, half caw of the hornbill, may be heard breaking through the unnatural stillness—meet inhabitants for such a place of gloom. Wherever there is a clearing or cultivation a few birds reappear. Thus at Handei I saw a *Corythaix* with its crested head and brilliant colours; a pale brown, crested pheasant-cuckoo, a large woodpecker, a swallow, puff-bird pigeon, golden-vented thrush, two species of hornbill, flycatcher, crow, hawk, kite, and eagle.

Let us now turn to the birds about Magila and Pangani. I cannot attempt to assign specific names to such birds as came under my notice, my only object being to convey some general notion of the animals which enter into the elements of an African landscape.

Starting from the sea-shore to the east of Pangani, upon which the curlew and the sand bird appear to be the sole tenants, and passing up the river along which a large spotted black and white kingfisher is skimming with rapid, regular beats, we reach the swamps to the west of Pangani. As we enter, a fine glossy white heron rises with heavy flight and disappears over the trees, while the sacred ibis, startled in its haunts, as quickly becomes invisible. No other waders are to be seen, but our attention is attracted by a beautiful crimson and blue kingfisher sitting over the lagoon, ever and anon darting into the water after its prey, while its more sober coloured relative the halcyon, with sleepy-looking mien sits on the branch of a tree ready to dart on the first unfortunate insect which should come within its reach. With the exception of the “parson crow” and a blue jay, little else of the feathered creation is to be seen.

Leaving the reeking swamps and climbing up to the top of the cultivated terrace which surrounds Pangani, our ears are greeted with a burst of music which at once refutes the common notion, that no good singing birds are to be found in the tropics. Pleasant it is to hear in the fresh morning air the golden-vented thrush which, more golden in song than colour, everywhere salutes the traveller with its joyous warbling. It stands pre-eminently out as the best songster of East Africa. Next to it comes what is here called the Tepe-tepe, a species of cuckoo which is everywhere heard tooting out a most exquisite liquid note. There are numerous other birds which have many pleasant notes, though seldom developing into song.

Of all the families of birds, none are so numerous or conspicuous as the weaver birds, which vie in colour with all others. About Pangani, three species are specially common; a yellow one which suspends its nest from the branches of a tree, and may continually be seen fluttering about it like a diligent housewife, twittering away all the time. The other two are not so active in their movements, being generally seen sitting solemnly on the sedges upon which they build their nests. The one is coloured black and crimson, and the other adorned with velvet and gold. The former varies in plumage very much according to the season of the year. About Magila and Umba the Whydah bird is common, with its small body and long tail. In flying, the tail seems to assist its movements as it assumes an undulatory motion. All the weaver birds prefer open situations. Bee-eaters are common, especially near the coast. Sun birds are rare, two species only having been seen, a green one with a metallic glance and a dull-coloured form. The latter I saw drinking tembo on a coco-nut tree. It is said that they thus frequently become intoxicated and fall to the ground. A golden-coloured oriole is sometimes seen. Two species of puff-birds now and then show themselves upon the trees, looking somewhat dull and inactive, but rejoicing in crimson and yellow colours. At Handei I observed a third species black and white in colour. Besides the cuckoo already mentioned, there are two species of pheasant-cuckoos, both small birds with long tails, which are seen hopping about amongst the bushes. The one is pale-brown and crested, the other almost black. If we now leave the more open ground and enter the wood we may see a few additional birds. Here and there flit past a small pigeon, a blue jay, or a hawk, while in the distance you may hear the discordant caw of the hornbill, of which there are several species ranging in size from a jackdaw to a large heron. Almost equally unpleasant is the scream of two small species of parrots as they fly with rapid beats of the wing from tree to tree. One of these is quite green, the other very dark in colour. They are found most abundantly about Magila. If we now add a crested flycatcher, and two species of shrike in the bushes; the goat-sucker, and the owl, a kite and two species of eagle overhead, a pretty little sparrow, and two species of

woodpecker, we shall have noticed all the birds which the ordinary traveller may expect to see in travelling from Pangani to Handei.

I am informed that Magila is a great resort of migratory birds, varying every two or three months in the classes which visit it.

Turning now to the Mammalia we find a most meagre list. Two species of mongoose occur, one the ordinary dull-grey striped form, the other black, with longer hair, and much larger in size, attaining to that of the cat. Leopards and hyenas are found, though by no means abundantly. The spotted hyena occurs at Umba. The footprints of both these animals were sometimes seen on the pathway. At Umba and in the wilderness the lion is found. While we were there Mr. Johnston heard one roar. Antelopes are also said to occur at Umba. Of monkeys, there are three or four species of *Cercopithecus* and two of *Colobus* in the woods. Only one individual of the former was seen. Of the latter one species, *C. Kirkii*, has only been seen once alive; but fortunately Dr. Kirk was the observer, and it is now placed in the British Museum.

On the Origin of the Flora of the European Alps.

By JOHN BALL, F.R.S.

(A Lecture delivered at the Evening Meeting, June 9th, 1879.)

THE title of the lecture announced for this evening may have led some of the audience to expect a lively description of the flora of the Alps which might, if I possessed the requisite literary skill, recall to many amongst you the thrill of intense delight, never to be forgotten, with which you first beheld some of the exquisite forms of vegetable life that adorn the higher region of the mountains. Far different is the task which I propose to undertake this evening. I have to entreat your earnest attention while I attempt to wrestle with a problem of formidable difficulty, and to point out to you the direction in which, as I believe, the solution is to be sought.

As you well know, a scientific revolution, more enduring perhaps in its effects than the great political events of the same period, has been effected within the last quarter of a century. The present order of nature, which once appeared to be a disconnected fragment of the cosmos, is now seen to have its roots in the past. The history of our earth, and of the forms of life that inhabit it, is now regarded as a continuous whole, governed by laws that have operated throughout a period so vast that our minds can only dimly apprehend its immensity. However limited may be our power to trace backwards the sequence of phenomena, owing to our imperfect knowledge of the laws that regulate them, the attempt is no longer deemed hopeless; and men of science, by many different paths, and with various degrees of success, are engaged in the endeavour to connect the story of the present with that of the past conditions of our planet.

A passion for mountain scenery led me from my youth onwards to pass much of my time in the Alps, and to visit other mountain districts, such as the Carpathians, the Pyrenees, and the mountains of Southern Spain, to say nothing of the hills of our own islands. It was impossible to collect, as I did, the plants of all these districts without being struck at once by the resemblances and the contrasts presented by their respective floras, and without being led to endeavour to account for them. More than twenty years ago I began to tabulate the plants of the Alps, so as to show the distribution of each species within the range of the Alps, and on the other mountains of Europe. As the southern side of the main chain has the richest and most varied flora, and was at that time the less fully known, I divided it into fifty districts, and set myself to collect materials from published works, from public and private herbaria, and mainly from my own repeated visits—this part of my work involving, in fact, the preparation of fifty local floras. Though I regard the work of botanical exploration as yet far from complete, I in this way accumulated a great mass of materials, and the question then arose as to what conclusions should be drawn from them.

For many years, in the intervals of other occupations, my mind often reverted, but with little result, to the problem of the origin of the flora of the Alps and of other mountain regions. If I believe that I am now able to offer at least a partial explanation of the difficulties that long seemed to me inexplicable, I feel assured that I owe this altogether to the circumstance that the inquiry was commenced and carried on at the period when the study of natural science received a new direction and a fresh impulse from the establishment of the doctrine that is mainly associated with the name of Charles Darwin. In immediate connection with my own subject, the two masterly essays ‘On the Origin, Affinities, and Distribution of the Australian Flora,’ and the ‘Outlines of the Distribution of Arctic Plants,’ which have placed the name of Hooker amongst those of the founders of the doctrine of evolution, served especially to guide my efforts, and to enlarge the sphere of my conceptions.

If they have not in their writings directly discussed the perplexing problem of the origin of the Alpine flora, and if some of their opinions bearing upon it seem to me open to question, I have felt assured that the methods applied by Darwin, and brilliantly illustrated by Hooker, would ultimately lead in the true direction. I venture to think that I have shown myself not less their true disciple in refusing to be bound by their authority on particular points, where it seems that the facts require an interpretation different from that which they have adopted.

As you will presently perceive, the inquiry which I invite you to undertake is a far-reaching one. It will demand a full knowledge of the geographical distribution of plants throughout the earth at the present time; and it will lead us back through the long roll of geological

ages to the earliest records of the presence of organised life on our planet. It is only fitting that I should at once acknowledge a very deep sense of the inadequacy of my own attainments for worthily treating a subject so vast and so intricate. I may perchance be speaking in the presence of some of the few men who are thoroughly competent to undertake such an enterprise; but as none can so well measure its difficulties, none are so likely to make full allowance for my inevitable shortcomings. If I were, however, completely possessed of all that is now known as to the present and the past, I should yet have to confess the insufficiency of my knowledge. The world is, even in a merely topographical sense, in great part unexplored: in a scientific sense, as my friend, Professor Thisleton Dyer, pointed out in his lecture last year, only a small portion can be said to be moderately well known.

It is therefore not unfitting that the bare outline of my views, which is all that I can lay before you this evening, should be addressed to an audience largely composed of those to whose activity we must look for additions to our knowledge which may confirm or correct our conclusions.

I must begin by endeavouring briefly to give you a sketch of the facts which we must seek to explain. I shall bear in mind that this is not an assembly of botanists, and I shall not weary you with technical details, nor inflict on you more than two or three of those Latin names in which botanists are supposed to delight.

In speaking of the flora of the Alps, I include the entire region extending from Dauphiné and Provence to the borders of Hungary, limited to the south-east by the plateau of the Karst. The ranges extending from Croatia into Bosnia and Dalmatia are often spoken of as the Dinaric Alps; but both by their orographic relations and their natural productions they belong to the mountain system of European Turkey. It is not equally easy to fix the limits of the Alps on the northern and southern sides where the mountains gradually subside into the plains. On the south side especially many plants whose natural home is in the low country, have spread into the valleys, and appear here and there as immigrants; while, on the other hand, numerous natives of the warmer slopes (many of them not known to grow elsewhere) do not ascend to the higher zone, but cannot be excluded from the study of the Alpine flora. I have, as a rule, omitted from my lists the plants of the plains that appear in the Alps only as occasional stragglers, but I have included all the other indigenous species, although some of them do not rise more than two or three thousand feet above the sea-level.

I have one more prefatory remark. Everything that I have to say this evening refers only to the distribution of flowering plants. All the tribes which botanists call cryptogams, the ferns and club-mosses, and their allies, the mosses, fungi, and other lower organisms, are propagated

by means of extremely minute bodies, called spores, which are easily carried through the air to vast distances; their distribution is not therefore subject to the same conditions that affect seed-producing plants.

In ascending the Alps from the region of the olive, or the vine, to that of perpetual snow, we find, as you well know, a continuous change in the aspect of the vegetation, and botanists have distinguished various successive zones corresponding to these changes. For our present purpose it will be enough to take account of three well-marked divisions:—a lower zone extending up to the limit of deciduous trees, an upper zone including the higher pine forests and the Alpine pastures, and a glacial region where patches of snow remain through the summer, and only a part of the surface is cleared for two or three months, and even there sharp night frosts frequently recur.

As we mount the outer slopes, the ash, the oak, and the wych elm successively disappear, the beech, the sycamore, the aspen, and the mountain ash forming the last representatives of ordinary tree vegetation, the beech alone forming forests in some part of the Alps. Along with these trees a large number of shrubs and herbaceous plants are left behind, while an almost equal number of species not before seen make their appearance. The common expression which I have used—the limit of deciduous trees—is not indeed strictly correct. The birch, the green alder, and some willows often climb as high as the highest pines, and the beech, in the form of a stunted bush, occasionally goes nearly as high.

In the upper zone of the Alps, coniferous trees form a broad girdle between the snowy crest and the lower slopes, but, chiefly through the agency of man, they have been extensively cleared, and Alpine meadows and pastures, bright in the early summer with hundreds of gay flowers, stretch upwards to the glacial region. The Scotch fir, which reaches in Scandinavia to the North Cape, 300 miles beyond the Arctic circle, is in the Alps left far below by the spruce fir, which in Norway scarcely passes the Arctic circle. In the Alps, the spruce usually ascends to nearly 6000 feet above the sea, and on the south side surpasses that limit by 600 or 700 feet. Higher still the larch and the Siberian fir often surpass the level of 7000 feet. To the glacial region I shall have later to recur.

I now proceed to give you in a few words the vegetable statistics of the Alps. I find in the whole region 2010 species divided into 523 genera, included in 96 natural orders. But of these natural orders there are no less than 36 that are not at all represented in the higher zone, and in the lower, only by a few genera and species of wide range. These 36 orders include 53 genera and 76 species—only an average of about 2 species for each order—and evidently represent groups whose natural home must be sought elsewhere. In addition to the 2010 species I reckon no less than 335 subspecies—forms closely allied to recognised species, but distinguished by differences more permanent and better

marked than what are commonly called varieties. Most of these, as well as a great many which I reckon as mere varieties, are counted as separate species by many French and German botanists.

I shall not read to you the list of the natural orders and the proportionate number of genera and species belonging to each; * but I must say something of the more characteristic of them. The largest number of species are included in three natural orders that are spread throughout every part of the globe. First come the *Compositæ*, with numerous small florets growing on a disc, including such familiar forms as the daisy, aster, marigold, thistle, and dandelion. Of these we have in the Alps no less than 62 different genera, with 250 species and 60 subspecies. Then come the leguminous plants, most numerous in the warmer parts of the earth, but represented by several species even in the polar

* The following are the natural orders represented in the Alpine flora; those printed in italics do not extend to the higher zone:—

Ranunculaceæ.	Rhamnea.	Campanulaceæ.	Plantaginæ.	Conifera.
<i>Berberidea.</i>	<i>Sapindaceæ</i> (Acer).	Vacciniæ.	Chenopodiaceæ.	<i>Gnetaceæ.</i>
<i>Nymphaeaceæ.</i>	<i>Anacardiaceæ.</i>	Ericaceæ.	Polygonaceæ.	Orchideæ.
Papaveraceæ.	Leguminosæ.	Pyrolaceæ.	Paronychiæ.	Iridæ.
Crucifera.	Rosacæ.	<i>Monotroper.</i>	Thymelæ.	Amaryllidæ.
<i>Resedaceæ.</i>	Saxifragæ.	Plumbaginæ.	<i>Aleagneæ.</i>	<i>Alismaceæ.</i>
Cistaceæ.	Crassulaceæ.	Primulaceæ.	<i>Urticaceæ.</i>	Juncaginæ.
Violariæ.	<i>Droseraceæ.</i>	<i>Oleaceæ.</i>	<i>Cannabineæ.</i>	Butamæ.
Polygalæ.	Haloragæ.	<i>Asclepiadæ.</i>	<i>Ulmaceæ.</i>	Typhaceæ.
Caryophyllæ.	<i>Lythraræ.</i>	Gentianæ.	Betulaceæ.	<i>Aroidæ.</i>
<i>Portulacæ.</i>	Onagraræ.	Polemoniaceæ.	Salicinæ.	<i>Lemnaceæ.</i>
<i>Tamariscinæ.</i>	Umbellifera.	Boraginæ.	Euphorbiaceæ.	Liliaceæ.
<i>Malvaceæ.</i>	<i>Araliaceæ.</i>	<i>Convolvulaceæ.</i>	<i>Buxinæ.</i>	Meianthaceæ.
<i>Tiliaceæ.</i>	<i>Cornæ.</i>	<i>Solanaceæ.</i>	Empetræ.	Smilacæ.
Hypericinæ.	Caprifoliaceæ.	Scrophularinæ.	<i>Aristolochiæ.</i>	<i>Asparagæ.</i>
Lilacæ.	Rubiaceæ.	Orobanchæ.	<i>Cupulifera.</i>	Juncæ.
Geraniaceæ.	Valerianæ.	Lentibulariæ.	<i>Corylaceæ.</i>	Cyperaceæ.
<i>Rutaceæ.</i>	Dipsacæ.	Selaginæ.	<i>Loranthaceæ.</i>	Graminæ.
<i>Illiciæ.</i>	Compositæ.	Labiæ.	Santalaceæ.	
<i>Celastrinæ.</i>				

The following show the number of genera, species, and subspecies belonging to each of the chief natural orders in the general flora of the Alps, and in that of the higher zone above the level of deciduous trees:—

FOR THE ALPINE FLORA IN GENERAL.				IN THE HIGHER ZONE OF THE ALPS.			
Natural Order.	No of Genera.	Species.	Sub-species.	Natural Order.	No of Genera.	Species.	Sub-species.
Compositæ	62	250	60	Compositæ	33	145	30
Leguminosæ	20	134	24	Crucifera	17	74	11
Graminæ	44	134	13	Leguminosæ	15	72	6
Crucifera	26	115	15	Caryophyllæ	10	71	10
Cyperaceæ	9	108	5	Graminæ	16	66	6
Caryophyllæ	17	101	15	Cyperaceæ	5	63	4
Umbellifera	27	94	14	Scrophularinæ	16	53	8
Scrophularinæ	16	81	10	Rosacæ	11	49	5
Rosacæ	16	82	18	Umbellifera	14	45	7
Ranunculaceæ	15	71	22	Ranunculaceæ	9	41	7
Labiæ	26	67	7	Labiæ	16	39	4
Liliacæ	13	43	6	Saxifragæ	4	37	6
Saxifragæ	4	42	9	Campanulaceæ	2	30	4
Campanulaceæ	6	42	4	Primulaceæ	6	29	6
Orchideæ	22	40	6	Gentianæ	3	23	1
Primulaceæ	8	36	8	Orchideæ	11	19	2
Boraginæ	15	31	4	Juncæ	2	13	2
Rubiaceæ	3	30	9	Liliacæ	8	17	0
Salicinæ	2	29	3	Crassulaceæ	2	16	5
Juncæ	2	27	4	Rubiaceæ	2	16	3
Gentianæ	6	26	6	Salicinæ	1	16	0
Geraniaceæ	4	24	0	Violariæ	1	12	3
Polygonaceæ	3	24	2	Polygonaceæ	3	11	0
Crassulaceæ	3	22	10	Onagraræ	2	10	3
Enphorbiacæ	2	20	2	Valerianæ	2	10	0
	genera	species	sub-species.		genera	species	sub-species.
25 orders include	385	1675	232	25 orders include	220	932	133
71 remaining orders } include }	138	335	53	35 remaining orders } include }	59	125	17

regions, and the grasses, no less widely spread in all regions, each of these families having in the Alps 134 species.

After these great orders which predominate in most other parts of the world, the families most numerously represented in the Alps are those which extend widely through the cooler regions, and are everywhere characteristic of, though not usually confined to the mountains. Of these the most conspicuous, both by the number of species and individuals, are the crucifers, the sedge tribe, the *Caryophylleæ*, including the pinks, chickweeds, sandworts, and the like, and the *Umbellifereæ*. These seven orders include nearly one-half of the whole Alpine flora—936 out of 2010 species. Without going into further detail, I must call your attention to some natural groups that are especially characteristic of mountain vegetation throughout the world—the six families which take their names from the rose, the ranunculus, the saxifrage, the primrose, the campanula, and the gentian. These, almost everywhere in the world, adorn the higher mountains, increasing in importance, both in the proportionate number of species and in the brilliancy of their flowers, as we ascend towards the snow region. Of the entire Alpine flora, these six families form about 15 per cent.; in the higher zone they furnish very nearly 20 per cent., and in the highest of all, towards the limits of perpetual snow, about one-third of the species usually belong to them.

In the flora of the upper zone of the Alps I count 1117 different species, which have been arranged in 279 genera and 60 natural orders. The proportion which the natural orders bear to each other is not very different from that which they show in the general flora of the Alps. The *Compositæ* still form about one-eighth of the whole; but the leguminous tribe, the grasses, and the *Umbellifereæ*, show a smaller percentage. The crucifers and the *Caryophylleæ* are comparatively more numerous, as are the six tribes which I have already spoken of as especially characteristic of mountain floras. For the glacial region I shall not attempt to give you accurate figures, for the simple reason that sufficient materials do not exist. I have long since ascertained that the real check to the extension of many species in the highest zone of the Alps is not climatal, but the want of soil and situation suitable to each plant; and where from accidental circumstances these are found, the glacial region is seen not to be so inhospitable as is commonly supposed. Perhaps you will allow me to give an illustration from my own reminiscences.

More than twenty years ago I started one morning from the Eggischhorn with a vague intention of reaching the uppermost end of the Great Glacier of Aletsch, and looking down on the pastures of the Wengern Alp from what is now known as the Jungfrau Joch. The sun was hot, there was much fresh snow on the glacier, and at every step I and my companion, with our heads burning and our feet freezing, sank deep

into the soft, pasty mass. After several hours of this exercise, compared to which the treadmill must be a delightful pastime, I satisfied myself that I should never arrive at the intended point in time to return by daylight, so I resolved that I would alter my plan, and do a little botanising instead.

Those of you who know the Aletsch Glacier—the vastest snow-field in Europe—may well be surprised to hear of anyone attempting to botanise there. Leagues long, the great ice-river, with a channel from 2 to 3 miles wide, flows between steep snow-covered slopes, from which here and there project some teeth of black rock. But I had noticed, just at the point where the two great tributary streams, one flowing from the east, the other from the west, join the main current, that on the southern slope of a ridge bounding the Grünhorn Glacier, there was a steep slope of fine *débris* clear of snow. Following the track of some chamois, I found a way from the glacier to the base of this slope, and ascended it to a range of projecting rocks which, by the Swiss federal map, are about 10,700 feet above the sea. On this slope, at a height of nearly 2000 feet above the much-talked-of Jardin, near Chamouni, and far more widely separated from otherspots inhabited by Alpine plants, I gathered over forty species in flower, one of them being the common thyme, another a variety of the still commoner dandelion. I give this as a single instance within my own experience; but until many such spots are examined throughout the whole chain of the Alps, it will be too soon to attempt an enumeration of the glacial flora. If the members of the Alpine clubs of our own and other countries will be prevailed upon to use their eyes as well as their legs, and, better still, to preserve a few specimens that will fit in a pocket-book for future reference and verification, we shall get to know much more than we now do of the vegetation of the highest region. Favourable situations become so rare above the level of 10,000 feet, that no single traveller has many opportunities for observing them; but my own belief is that the number of plants capable of growing and reproducing themselves in the highest region of the Alps is much greater than has been hitherto supposed.

In connection with this matter it will be well to bear in mind the undoubted fact that some, perhaps many, species of plants give rise to races, which are in truth physiological varieties, distinguished by certain inherited tendencies, though not recognisable by outward differences of form. Thus artificial selection has produced in Norway a variety of barley which ripens its seed in less than two months, while the ordinary period is from three to four months, and several different varieties of maize in America and Northern Italy are known to present still greater differences in the time required for the ripening of the grain, or in the amount of summer heat which they demand or tolerate. It is probable that in many instances, such as that of the thyme found growing above the Aletsch Glacier, where plants flourish in the Alps under physical con-

ditions very different from those of their ordinary habitations, such individuals belong to physiological varieties which have acquired or recovered a hereditary capacity for suiting their development to the new conditions.

I forbear to give you other instances of a similar character, but I cannot avoid saying a few words as to the bearing on questions of Alpine vegetation of investigations on which much labour and research have been expended by several eminent men, and especially by Alphonse de Candolle, who has largely developed and improved the methods of his predecessors in the same line of inquiry, and at the same time has recognised some, but, as I think, not all of their inherent defects. Starting from the assumption that there is some minimum degree of temperature above the freezing-point which every species of plant requires in order to accomplish the various processes of its development, it is further assumed that a certain sum of temperature above that minimum will always be employed in achieving the cycle of changes on which depends the life of the plant and the propagation of the species. By careful study of the polar limits of the growth of certain widely diffused species, and a comparison of the periods of vegetation of each of them with the records of monthly mean temperature at various places, it has been sought to discover the sum of temperature appropriate to each, and on which its existence in a wild state is supposed to depend.

Without attempting to deny that in respect to some plants a measure of probable success has been attained, the results in other cases do not seem consistent with the supposition that temperatures, ascertained by the thermometer, in the shade, give much help towards ascertaining the conditions required for the growth of plants. However this may be as to the vegetation of the plains, I feel assured that the method is altogether inapplicable to that of high mountains. The difficulty of estimating the difference between the effects of air temperature in the shade and those of direct exposure to the sun, did not escape the penetration of Humboldt, the true founder of this branch of botanical science; and it has been considered by Alphonse de Candolle. He admits that for Central Europe the difference in summer between the temperature of a thermometer in the shade and one exposed to the sun may be from 5° to 8° Fahr., but assigns various sufficient reasons why the effect produced on plants should be less considerable; and he finally estimates the effective difference of temperature between growth in the sun and in the shade, at 1° of the centigrade scale, or less than 2° Fahr. On this I must remark that no one who has not experienced it seems to have any adequate idea of the intense effect of the sun's rays in the higher regions of the atmosphere, and the few observations contained in a report which I presented to the British Association in 1862, do not seem to have attracted the attention of naturalists. The mean difference shown in summer from fifteen years of careful observation made at Chiswick, between the temperature in the shade and that of a black

bulb thermometer, exposed to the sun, was a fraction less than 7° Fahr. We have no parallel series of observations on high mountains; but some indication of the effects of solar radiation is given by the fact that in fourteen observations, at heights varying from 4000 to 14,000 feet above the sea-level, exposure of a small black bulb thermometer for three minutes in the sun raised its temperature to an average of 40° above that in the shade, and in five observations made at an average height of 12,000 feet, the average difference was 46° .

Still more significant are the observations on the temperature of the soil exposed to the sun contained in the same report. On the slope above the Aletsch Glacier, at a height of about 10,300 feet, I found the temperature at 1 inch below the surface to be 83° , and at 5 inches, about the greatest depth to which the roots of Alpine plants commonly penetrate, the thermometer marked 75° . On another occasion, at the height of about 8400 feet, in the Pyrenees, an ordinary thermometer laid on the surface, near to large patches of snow, marked $107^{\circ}\cdot6$, and when buried to a depth of an inch and a half, stood fixed at 99° .

We are yet very far from being able to estimate the effects of these high temperatures, and of the stimulus of intense illumination, on the growth of Alpine plants; but it may be safely asserted that observations taken with a thermometer in the shade, do little to illustrate the actual conditions of their life.

Let us now proceed to compare the flora of the Alps with those of other regions, and see what light may in that way be thrown upon its history and origin.

The first thing that strikes one in going through the list is the large proportion—more than two-fifths of the whole number—that are to be found in the floras of all parts of temperate Europe, the majority extending indeed to Siberia, and a considerable number even to North America. These are clearly plants that have a considerable power of adapting themselves to varied physical conditions, and whose vigorous organisation has made them victorious in the struggle for existence. Out of 792 species of this class that are present in the Alps, no less than 215 extend to North America, and not a few, especially of the aquatic species, have reached the furthestmost ends of the earth in South America, South Africa, Australia, and New Zealand. You must notice that out of this large number of species not one in twelve (only 65 in 792) can be reckoned as plants of the higher mountain region. They are indeed, most of them, common enough in the lower zone of the Alps, but they grow equally freely in the woods and heaths and waste ground of Middle Europe, whence not a few extend northward within the Arctic circle.

If we take away the 727 species which form no special element in the Alpine flora, and also some 50 stragglers from the South—Mediterranean species that have contrived to establish themselves here and there in the mountain valleys—we have left 1157 species in our list, as to which we

must make closer inquiry. Of these, 172 species are to be reckoned as endemic—that is to say, confined to this particular region—of which 42 have spread from the Alps as a centre, either along the Apennine chain or into Croatia or Dalmatia, so that the number of endemic species absolutely limited to the Alps is reduced to 130. To that number many botanists would add ten or eleven well-marked subspecies, while others would double my estimate by reckoning as species numerous forms which I call varieties. Let us now consider the remaining species which are not confined to the Alps, but are mountain plants, only those among them that extend to the Arctic regions being there inhabitants of the low country.

As you might expect, when we come to a comparison with the floras of other mountain regions, we find that the Alps have many elements in common with the Pyrenees and the Carpathians. I must not weary you with figures, and therefore trust you will take my word for the general accuracy of the following summary. Out of 1157 species more than one-seventh are endemic, rather more than half are common to the Alps and the Pyrenees, just two-thirds are common to the Alps and Carpathians, while rather more than one-sixth are common to the Alps and the north of Europe and Asia. A large majority of the latter extend beyond the Arctic circle only in Scandinavia, owing to causes to which I shall have further to allude. It is worth your while to note especially this fact, that of the plants that are common to the Alps and the north of the old continent, the larger number do not extend to all the three great mountain ranges of Central Europe; the Pyrenees possess only about one-third of the whole, while the Carpathians have just two-thirds, and there are about 40 species which are common to the Alps and to Northern Europe, but have not been found either in the Pyrenees or the Carpathians. At the present time the Alps are separated from the higher summits of the Carpathians, and from the Pyrenees, by only a moderate interval of about 200 miles of comparatively low country; but during the middle tertiary period, and perhaps again at a later date, they were divided by arms of the sea that then changed Europe into an archipelago. We find, however, much more difference between the Alps and the Pyrenees than between the Alps and the Carpathians. Counting, as we are bound to do, the Asturian chain as a portion of the Pyrenees, each region has about half of its flora common to the other; the Alps have 172 endemic species and at least 15 genera that are not found in the Pyrenees, while the latter range counts about 100 endemic species with several (six or seven) genera not found in the Alps. With the Carpathians the connection is much closer; that range possesses two-thirds of the Alpine flora, and only from 30 to 40 endemic species. But it has a great many species that must be called Eastern, as they are common to the Caucasus or the Balkan Peninsula, which do not extend to the Alps.

If you will turn your eyes to the large map of the world, you will see that the old continent, from the north-west corner of Spain to Kamtchatka, is traversed by almost continuous mountain ranges, leaving nowhere a gap of more than about 300 miles in a distance of some 8500 English miles. If you follow the line from the Pyrenees through the Alps, the Carpathians, and the Caucasus, to Northern Persia, you come to the western end of the great highland region of Central Asia, and you find that instead of continuing along a single range, nearly half of the Asiatic continent is occupied by mountain chains, having a general direction from west to east, with plateaux between, mostly of great height, but in parts subsiding to a comparatively low level. Of this vast region we know little scientifically except as to the great Himalayan range in the south, and the northern range forming the southern boundary of Siberia, which I shall speak of as the Altai, although that name properly belongs only to a small portion of the collective mass. It is very remarkable that when we compare the Alpine flora with those of other mountain regions not immediately adjoining, we find the closest affinity to be with these mountains of Northern Asia, notwithstanding the vast interval of space that divides them, and the wide differences in their climatal conditions. Fully one-fourth of the species of the Alpine flora are present in the Altai region, as also are about five-sixths of the genera. This is the more noteworthy, as we have in the Caucasus, at a third of the distance that divides the Alps from the Altai, a great mountain mass with a rich Alpine flora, and enjoying a much more favourable climate, where the proportion of species common to the Alps is much smaller. You may reckon that out of every twelve Alpine species, three are to be found in the Altai, and only two in the Caucasus.

The Alpine flora is represented in the Himalaya by a large number of the same genera, but comparatively few of the same species; and I must especially call your attention to the fact that many of the species that are common to the Alps and the Altai, or the Himalaya, extend also to the Arctic regions of the old world. But you must also bear in mind that this holds true only as to some of the species in question, and that many genera not at all represented in the Arctic flora are common to the Alps and the mountains of Asia.

I now approach with some trepidation a branch of my subject where I am unable to follow those whom I have been used to look up to as my masters in natural science. I have briefly to discuss the relations between the Alpine flora and that of the Arctic regions, and the inferences to be drawn from the facts. In the memoir to which I have already referred, Sir Joseph Hooker brought together all the facts then accessible as to the constitution of the Arctic flora, and the distribution of species forming it throughout the rest of the world. Having shown what a large proportion of these are spread throughout Europe, including the Alps, not a few extending even to the south temperate zone, he

sums up a masterly analysis of the facts by the conclusion that this Arctic flora, most fully developed in Scandinavia, flourished there before the glacial period, and was then driven southward across the old and new worlds, returning again northward, and ascending the mountains of both continents, when a more temperate climate offered the necessary conditions of existence. In its general outlines the conclusion thus drawn had already been put forth in the 'Origin of Species,' and was fully accepted by Lyell; so you will perceive what a formidable weight of authority lies in the scale against one who seeks to contend against, or even to modify it.

In the first place, I must remark that of the plants enumerated by Hooker as extending beyond the Arctic circle, nearly one-half are those ubiquitous species which, owing to their power of adapting themselves to very varied external conditions, have spread themselves over the temperate old world, and many of them also throughout temperate America. Whatever significance may be attached to the presence of these plants in the Arctic flora, there seems no reason for supposing that they have originated in that region. At the present time they are more common in the true temperate zone than elsewhere; and if we were to speculate upon their origin from noting the regions in which the groups to which they belong most abound, there are not a few that would be referred rather to the Mediterranean region than to a more northern home. Further, as Hooker has been careful to point out, the climate of Northern Scandinavia is most materially affected by the Gulf Stream—perhaps also by the south-west winds from the Atlantic—and forms a quite exceptional division of the Arctic flora. There, and there alone, forest trees, and even the cultivation of barley, extend far north of the Arctic circle; and as a natural consequence a multitude of other plants have spread into a district which is indeed geographically Arctic, but which by its climatal conditions belongs to the cooler temperate zone. Leaving out of account all the species which in Central Europe are characteristic of mountain vegetation, I have counted 217 species in Hooker's catalogue which nowhere reach the Arctic circle except in Scandinavia, and which nearly all extend to the Mediterranean region; and to these I add 131 more ubiquitous species, which are, indeed, truly Arctic, but are no less truly temperate, being all widely spread throughout the northern hemisphere. We thus find that the list of characteristic or non-temperate Arctic plants must be reduced by at least 348 species. It is true that few of these are absent from the lower zone of the Alps; but it is a curious fact that, although they are all fitted to resist the severity of the Arctic climate, the great majority—fully four-fifths—do not in the Alps ascend to the higher zone, and very few approach to the limit of perpetual snow.

Struck by the fact that nearly all the ubiquitous species which I have struck out from the Alpine and Arctic lists are common to Northern Asia, and by the further fact that there is a closer connection between the

Alpine flora and that of the Siberian mountains than with any other distant range, and finding that what I should call the true Arctic flora is more largely represented in the same region than it is in the mountains of Central Europe, Dr. Christ, of Basel, in a memoir which I should like to discuss more fully if time permitted, comes to the conclusion that Northern Asia is the original home alike of the Arctic flora and of that portion of the Alpine flora that he assumes to have been derived from a distance. For the present I will beg you to defer any conclusion as to the origin of these floras, and merely to note the facts as they present themselves, and bear in mind the following proportions, accurate enough for our purpose.

Of the species included in the Alpine flora, 17 per cent. are common to the Arctic flora, and 25 per cent. are common to the Altai range, while the Arctic flora has 40 per cent. common to the Alps and 50 per cent. common to the Altai, using this as a collective name for the ranges of Northern Asia.

Now if, in deference to the great authorities I have named, I were to admit that every one of the Arctic species common to the Alps had originally reached the mountains of Central Europe by migration from the north, I ask how far that would avail towards an explanation of the origin of the Alpine flora? If we had accounted for 17 per cent. of the species, what should we have to say of the remaining 83 per cent., including at least four generic types peculiar to the Alps, and a very large number not found in the Arctic regions—of the genera present in the higher zone of the Alps only one-half being Arctic? Is it credible that in the short interval since the close of the glacial period, hundreds of very distinct species and several genera have been developed in the Alps, and—what is no less hard to conceive—that several of these non-Arctic species and genera should still more recently have been distributed at wide intervals throughout a discontinuous mountain chain some 1500 miles in length, from the Pyrenees to the Eastern Carpathians? Nor would the difficulties cease there. You would have left unexplained the fact that many of these non-Arctic types which are present in the Alps are represented in the mountains of distant regions, not by the same, but by allied species, which must have descended from a common ancestor: that one species of *Wulfenia*, for example, inhabits one small corner of the Alps, that another is found in Northern Syria, while a third allied species has its home in the Himalaya.

I cannot give you a better illustration of the general problem with which we have to deal than by taking the Saxifrages, perhaps of all generic groups the most characteristic of high mountain vegetation. It is the more convenient to do so that the distribution of the Saxifrages has been very carefully studied by Engler; and, reserving doubts as to a few details, I take his results as they stand.

With comparatively slight differences in the structure of the flower

and fruit, the Saxifrages exhibit the most extraordinary diversities in foliage and mode of growth, so great, indeed, that if the plants were preserved in a fossil state, without the floral organs, it would never occur to the most experienced botanist to refer them to the same genus, scarcely, indeed, to the same natural order. Engler, for the most part following previous writers, groups the 166 species described by him into fifteen sections. No less than eleven of these sections, corresponding to as many different types of vegetation, are represented in the Alps, which show a greater variety than any other mountain region. Of these ten are found in the Pyrenees, nine in the Carpathians, and eight in the Arctic regions. If we go still further afield, we find Saxifrages on the high mountains of the world almost everywhere, except in New Zealand and South Australia. In the Rocky Mountains six of our Alpine groups are represented, besides two others that do not extend to the old world. In the Andes we find five endemic species, all belonging to one group, which has numerous representatives in the Alps and the Pyrenees, two of the Andean being nearly allied to an Arctic species of that group which does not extend to the Alps. In the Himalaya six of the Alpine groups are represented, but for the most part by different species, three-fourths of the whole number being endemic. Finally, a single endemic species has been found in Abyssinia, belonging to a group that extends to the south-east of Europe, and thence through Asia Minor to the Himalaya.*

* The following table shows the results of Engler's researches on the distribution of the Genus *Saxifraga* in the chief mountain regions of the world, and within the Arctic circle. The numbers show the number of different species of each section of the genus hitherto found in each region:—

Sections.	European Alps.	Carpathians.	Pyrenees.	Arctic Regions.	Caucasus and Armenia.	Himalaya.	Mountains of N. Asia.	Rocky Mountains.	Andes.
Cymbalaria ..	..	..	..	..	2	1			
Tridactylites ..	3	2	2	2	1	..	1	1	
Nephrophyllum ..	4	4	1	4	2	4	4	2	
Peltiphyllum ..	..	..	..	..	..	..	..	1	
Isomeria ..	..	..	..	1	..	..	..	3	
Miscopetalum ..	1	1	1	..	1	..	..
Hirculus ..	1	..	..	1	1	11	1	1	
Boraphila ..	2	2	2	6	..	3	9	9	
Dactyloides ..	8	5	10	1	1	..	2	1	5
Trachyphyllum ..	3	2	2	6	1	13	5	5	
Robertsonia ..	1	..	3	..	..	..	..	..
Euaizoonia ..	8	2	3	2	1	..	..	..
Kabschia ..	8	4	3	..	3	2	..	..
Bergenia ..	..	..	..	..	..	3	2	..	
Porphyron ..	4	2	3	2	..	1	1	1	
Endemic species in each region)	14	3	6	2	3	28	6	7	5

I have omitted Engler's section *Diptera*, which is peculiar to Japan, and I have added the small group called *Bergenia*, counted by some botanists as a separate genus, but united to *Saxifraga* by all the best authorities. It is very distinct in habit, and apparently confined to the mountains of Central and Northern Asia.

Engler imagines that at the close of the tertiary period six types of Saxifrage were already in existence, from which, as I understand him, he believes that the existing species were developed.

To go no further into detail, I will merely say that to one of these types he refers plants so utterly different as the London-pride of our gardens, the yellow saxifrage of the Alps and the hills of our lake district, the purple opposite-leaved saxifrage of the Alpine snow-region and the tops of our Highland mountains, and the *Saxifraga aizoon*, so common in the Alps, with thick cartilaginous leaves edged with pores from which carbonate of lime is deposited. I venture to think that no one who weighs the evidence as to the probable rate of change of specific types, along with the facts of geographical distribution, can for a moment suppose that types of vegetation so widely different in structure, including in all fifty-six mostly very distinct species, can have been developed from the same original parent within a period nearly so brief as that supposed.

It appears to me, indeed, that even as to species strictly belonging to the same group, it is contrary to every reasonable presumption to suppose that they have been differentiated within a period so very recent. If we suppose that the opposite-leaved saxifrage were carried during the glacial period from the Arctic regions to the mountains of Central Europe, this does not explain the existence of a very distinct species of the same group (*Saxifraga retusa*), scattered at wide intervals throughout the Alps, Carpathians and Pyrenees, but not known elsewhere in the world.

I proceed to another aspect of the question. If we assume that the Arctic flora, or a notable proportion of it, was diffused throughout the mountains of the northern hemisphere since the commencement of the glacial period, the question next arises—where was this flora before it appeared in the Arctic regions?

We have now abundant evidence that at a time geologically recent, in the middle tertiary, probably even in that of the newer tertiary period—the flora of the extreme north was essentially temperate, and that the climate must have been altogether unsuited to the plants now existing there.

I need not enter into the evidence, for the fact is admitted by all. I am not aware that any answer has been attempted to the question that I have just proposed, so that in laying before you the views to which I have been led, I feel free from the task of contending against the weight of authority.

Before going further, I must say a few words as to the bearing of recent discoveries in fossil botany on the subject before us. Among the many new and old truths which we owe to Darwin, must be reckoned the lively sense of the imperfection of the geological record now possessed by most naturalists, but not generally recognised before the

appearance of the 'Origin of Species.' As regards fossil records of the vegetation of mountain regions, however, the case is very much stronger than he has put it; and with few and trifling exceptions, to one of which I shall refer, the documents from which we might have gained any direct knowledge of the mountain vegetation of the past are irrevocably lost. Fossil plants are, under favourable conditions, preserved in shallow lakes or estuaries; but only by the rarest of chances can a plant from the upper mountain region be preserved in such deposits. In attempting to reason about the ancient vegetation of the mountain regions of the earth, we are thus left unaided by direct evidence, and it is unavoidable that our conclusions should be to a great extent speculative.

You are, most of you, aware that flowering plants are divided into two great classes, in one of which the development of the stem takes place from within, as in grasses, lilies, and palms, which are therefore called endogens; while in the other, which includes all deciduous trees and shrubs, and most of the herbaceous plants of Northern Europe, the new leaves and floral organs issue from the outer part of the stem or trunk, these being called exogens. Distinct in some important respects from both classes are what botanists call gymnosperms, including two important natural families, of which the types are the pine and the cypress. In their mode of development the gymnosperms agree with the exogens, differing however in the peculiar structure of their wood; but by the imperfection of their floral organs they approach more nearly to the higher cryptogams than does any other tribe of flowering plants. I think that modern researches, especially those of Professor Williamson of Owens College, have gone far to confirm the views of those who believe that the gymnospermous class were originally developed from a cryptogamic type that is now represented by the club-mosses. Certain it is that the evidence of fossil remains, so far as it goes, proves the existence of many and varied types of gymnosperms throughout the vast period occupied by the deposition of the carboniferous and Permian strata, where no other flowering plants, with the possible exception of a single endogen, have been detected.

During the secondary period endogens are found in fossil deposits, few in number and obscure in their affinities; but the appearance of the higher type of exogenous plants is not disclosed by direct evidence until about the middle of the cretaceous period. Then all at once, in deposits widely spread over the northern hemisphere, we encounter a crowd of species, belonging to very different types, but for the most part so nearly resembling living plants, that palæontologists do not hesitate to refer many of them to existing genera. Whatever doubts may exist as to particular species, this much is certain, that at the middle of the chalk period numerous trees belonging to many very different natural orders, and nearly allied to existing plants of the warm temperate and sub-

tropical zones, existed in Europe and North America, and far north of the Arctic circle in Greenland. From that time to the present day the story of the tree vegetation of the low lands of the northern hemisphere is nearly continuous, though doubtless very incomplete. Very few types have disappeared, many have migrated towards the warmer parts of the earth, while others still hold their ground in the north temperate zone.

In many cases we are able to trace a series of connecting forms between the earliest known species and those of the present day. The general conclusion must be that in spite of vast changes in physical conditions, and the still vaster period of time that has intervened, the amount of change that has supervened in the portion of the earth's vegetation thus disclosed to us has been comparatively slight. But if, at the commencement of the earliest chapter of the history accessible to us, the evolution of the flowering plants, and especially of the exogens, had already proceeded so far, where, I would ask, must we look for the earlier forms, the ancestral types from which our present groups have sprung? and where again for the much more remote forms which served to bridge over the interval, so perplexing to the botanist, between the endogens and the exogens? Impressed by the utter absence of exogenous trees from the earlier fossil deposits, M. de Saporta, one of the best authorities on this subject, is reduced to conjectures, one, as it seems to me, more improbable than another. This type of vegetation might, he suggests, have been gradually developed in some separate corner of the earth, not previously connected with the regions now known to us; or else, under the influence of some unknown cause, the process of evolution was at that period extraordinarily rapid. To my mind there is no alternative between abandoning the doctrine of evolution and admitting that the origin of the existing types of flowering plants is enormously more remote than the period as to which we have direct evidence. The difficulty to be got over is the utter absence of such evidence.

I shall now endeavour to show you the strong probability that the early development of the chief types of flowering plants took place under conditions such that no record could be preserved for us. I shall first point out that the ancient forms of vegetation belonging to the coal measures and earlier palæozoic formations flourished under physical conditions very different from those now obtaining, while at the same period there were portions of the earth where entirely different conditions prevailed, and where we ought to expect that the evolution of vegetable life would follow a very different course. In the history of the earth, regarded as the scene of organic life, there is one event of transeendent importance, to which I think sufficient attention is not commonly given. I allude to the deposition of the coal measures. It is a moderate estimate to fix $10\frac{1}{2}$ billions of tons as the weight of coal in the deposits known to us, and to reckon that a like amount exists in deposits yet undiscovered, or covered up by newer strata, or buried

beneath the sea. That would give 21 billions of tons of coal, containing by estimate 17 billions of tons of carbon, nearly all of which must have been extracted from the atmosphere, where it previously existed in combination with oxygen in the form of carbonic acid gas. In forming that amount of coal, the plants of that period must have set free more than 45 billions of tons of oxygen gas, increasing the quantity previously existing in the atmosphere by about 4 per cent. I shall leave out of account other agencies that have largely diminished the proportion of carbonic acid gas in the air since the palæozoic period, and merely remind you that the whole quantity now existing is estimated at 3 billions of tons, containing 818,000 millions of tons of carbon. The inference to be drawn, which I believe to be an under-statement of the truth, is that during ancient palæozoic times, before the deposition of the coal measures, the atmosphere contained twenty times as much carbonic acid gas, and considerably less oxygen than it does at present. You will believe that it is the want of time, and not of respect for the opinions of a great man, that prevents me from fully discussing the objections to this conclusion stated by Lyell in the later editions of his great work, the 'Principles of Geology.' Suffice it to say that they have not obtained the assent of competent authorities; and with that remark I resume my argument.

You well know that carbonic acid gas is much heavier than the other gases contained in the air, the proportion of weight for an equal volume being about three to two. If the air were at rest, and the proportions of the gases not disturbed by plants and animals, the result would be that the percentage of carbonic acid would diminish as we rise above the sea-level. But the quantity of this gas in the air, as we know it, is so small that it is liable to constant disturbance. Plants consume carbonic acid gas, animals restore it to the air. Where vegetation prevails over animal life and the consumption of fuel by man, as happens in most mountain countries and in the tropics, we should expect the proportion to be diminished; where opposite conditions prevail it should be increased; while in both cases currents in the air tend to disguise the effect. In point of fact, the few observations available on this subject are discordant, and are insufficient to establish any general conclusion as to the present state of things. But in an atmosphere containing twenty times the present proportion of the heavier gas, it can scarcely be doubted that the distribution of the gases in a vertical direction would at least approach to the condition of equilibrium. An accomplished mathematician, my friend Count St. Robert of Turin, has been kind enough to investigate the problem, and to calculate for me the proportion of carbonic acid gas which would be found at successive heights in an atmosphere at rest containing at the sea-level twenty times the present proportion. Omitting fractions, I have shown you in round numbers the approximate results in the table which is exhibited.

The proportion at the present day is taken to be five parts by weight in 10,000. In the older palæozoic times it was

At the sea-level	.. .. .	100 parts.
„ 3,000 metres, or 10,000 feet above the sea	.. .. .	82 „
„ 4,000 „ 13,000 „ „	.. .. .	74 „
„ 5,000 „ 16,400 „ „	.. .. .	67 „
„ 10,000 „ 32,800 „ „	.. .. .	12½ „

The proportion, which is still large up to a height of 5000 metres, then begins to diminish rapidly, and at double that height it becomes comparatively very moderate, little more indeed than has been sometimes observed in the open air, and perhaps not more than we should find at this moment in the hall where we are assembled.

But it was not only as regards the proportion of carbonic acid gas that the climate of the ancient mountains must have differed from that of the low country. Owing to the high and uniform temperature that prevailed throughout the earth, the air must have been charged nearly to saturation with the vapour of water; and these two constituents, freely allowing the passage of luminous heat, but, as we have learned from Tyndall's researches, nearly opaque to the non-luminous rays, served to maintain the constant high temperature of the lower region. But, as you have seen, different conditions prevailed on the ancient mountains, and especially in the highest regions, now scarcely habitable by organic life. The snow region on the Palæozoic Alps was probably much higher than it is now, even under the equator; in the higher zone the daily alternations of heat and cold, and the influence of the seasons, must have been almost as sensible as at present. Here, then, were conditions of existence incompatible with the organisation of the cryptogams and gymnosperms of the low country, and requiring the same adaptations of the organism to its surroundings that have resulted in the mountain floras of our own period. It is, I urge, on the high mountains of the ancient world that we should look for the origin of the higher types of vegetation, destined ultimately to prevail when the earth gradually assumed its modern condition. During the countless roll of ages that elapsed between the beginning of terrestrial vegetable life and the deposition of the coal measures, the various types of the principal natural orders were gradually differentiated in various parts of the globe, and then gradually distributed, as changes in the earth's surface offered facilities, or interposed barriers. Bearing in mind that the more strictly any species was originally adapted to the colder climate of the higher mountains, the less it will during its subsequent career have been exposed to varied physical conditions, I should expect to find that most of the genera, and perhaps a good many species, of our present mountain floras had come into existence before the close of the carboniferous epoch; and I think that the facts of geographical distribution will ultimately be found to confirm this opinion.

The period, vast in itself, yet short in comparison with the æons that rolled before, between the close of the carboniferous epoch and the later secondary period, when the more highly organised plants begin to appear in fossil deposits, would, if my views be correct, have been employed in the gradual differentiation of tribes adapted to the conditions of life at lower levels than their original home. To this period I should be inclined to refer the probable origin of many natural groups now confined to tropical and subtropical regions, which, being fitted for the then existing conditions, would have at length descended to the lower country, along with some members of earlier orders capable of adapting their development to altered conditions.

We should expect to find that the natural groups which were earliest adapted to the conditions of life in the lower region would be more widely distributed over the earth than those whose evolution in this direction was retarded; not only because the longer period of time would multiply the chances in their favour, but because they would have been able to profit by changes in the distribution of land and sea from which the late comers would have been debarred. Thus it is likely that Brazil, once a great mountain region, afterwards worn down by ages of denudation, was brought into partial relation with the African continent during the early secondary period by an archipelago extending over the equatorial Atlantic. Certain orders and genera would have thus been enabled to cross from one continent to the other, while other groups, not then fitted for the journey, would at a later period, when the archipelago had disappeared, find the ocean an impassable barrier.

During the tertiary period considerable changes of climate occurred in the northern hemisphere, and the influence of latitude upon climate seems to have become much more perceptible at low levels than it was during preceding periods. Along with these changes an increasing number of plants originally adapted only to the mountains would have descended to the plains, those possessing, so to say, the most elastic organisation being the more widely diffused. As the climate of the polar regions gradually approached that which now prevails, a certain proportion of the widely spread Alpine plants growing on mountains sufficiently near to be within the range of means of transport would have been carried to the Arctic regions and diffused more or less widely within that area, leaving behind many others, either less well suited for transport, or less adapted to Arctic conditions, which, it must never be forgotten, differ in many important respects from those of the mountains of lower latitudes.

Last chapter in the long roll of geological history, comes the glacial period. I am not concerned utterly to deny the probability of the opinion sanctioned by such names as those of Darwin, and Hooker, and Lyell, nor yet of that maintained by Dr. Christ and by Grisebach.

I could name a few plants whose present habitat on the mountains of Central Europe may probably date only from the glacial period, and there are a few others that have perhaps come in recent times from the mountains of Northern Asia; but I venture to affirm that the effects of the glacial period both on the distribution of plants and on the climate of Europe have been greatly overrated. Even during the period of maximum cold the highest ridges of the Alps were not completely covered with snow and ice; for we still see by the appearance of the surface the limit above which the ancient ice did not reach, and in the middle zone the slopes that rose above the ancient glaciers had a summer climate not very different from that which now prevails. In my opinion the effect of the glacial period on the growth of plants in the Alps was to lower the vertical height of the zones of vegetation by from one to two thousand feet. Time presses, and I cannot enter on details; but, in direct confirmation of what seems a bold assertion, I must mention an interesting discovery, due not to accident, but to the sagacity of the eminent Italian geologist, Stoppani. Reflecting that at the period of their maximum extension, when the glaciers filled the main valleys of the Alps, small lakes must have been formed by the damming of the streams from lateral valleys, and that such lakes might probably contain organic remains of the animals and plants of that period, Stoppani set himself to search in suitable localities, and was rewarded by finding several examples of the kind in the valleys of the Lombard Alps.* From one of these, along with remains of animals, were taken those of the sycamore, box, mountain elm, and yew, along with one or more leaves which are supposed to belong to an undetermined species of magnolia. Another deposit of the same period has produced remains of the chestnut, spruce fir, hazel, *Trapa natans*—a water plant now rare in lakes in Italy, but commoner on the north side of the Alps—and a walnut, which I believe to be no more than a variety of the common cultivated tree, no longer growing wild in Europe. It must indeed be admitted that during the glacial period the exceptional conditions that give to these islands, and to Scandinavia, an unnaturally mild climate, no longer prevailed, and that increased rainfall, with a moderate diminution of the mean temperature, caused a great extension of glaciers on all the mountains of Northern Europe; but that the climate of Middle Europe was such that the plants of the high Alps could spread across the plains seems to me an improbable supposition.

I fear that I have left myself no time to discuss a branch of my subject which would, I think, enable me to strengthen very much the presumptions in favour of the theory which I have ventured to lay before you. The geographical distribution of plants is a vast subject

* See Stoppani, 'Corso di Geologia,' Milan, 1871-1873, vol. ii. pp. 662, 669. The first locality mentioned is at Pianico in Val Borlezza, near the Lake of Iseo; the second is near Leffe in Val Seriana. Both are at about 1000 feet above the present sea-level.

which can scarcely be touched at all without entering into much detail. It divides itself into many different branches, and I can merely mention some of the leading facts, and trust to your perceiving how closely they bear on the main argument.

If the existing genera and natural orders of plants had been differentiated in modern geological times, during which it appears pretty certain that only one considerable change has taken place in the arrangement of land and water on the earth; we should expect to find some approach to uniformity in the way in which they are distributed throughout the world, since similar causes must have operated during the greater part of the period of their existence. The contrary, however, is the case. A botanist studying the distribution of the widely spread types of vegetation without any previous theory to disturb his mind, would be led to infer the most diverse relations between the main continental masses. Allowing for a large amount of possible extinction of some types in certain areas, the facts seem to me to suggest the probability that vast intervals of time, with corresponding changes on the earth's surface, intervened between the dates at which different orders and conspicuous genera have spread over the world.

I have exhibited to you rough maps, showing the distribution of land and water in Central Europe during three geological periods—those of the oolite, the chalk, and the middle tertiary. It would require an entire additional lecture if I were to attempt to illustrate in detail the bearing of the facts shown in these maps on the relations between the floras of the Alps, the Pyrenees, the Carpathians, and that of another mountain group of which for lack of time I have said nothing—that of the Balkan Peninsula. There are unexpected relations between the floras of different parts of this region, and contrasts between districts not far removed, that are equally unexplainable on the supposition that the existing flora is of geologically modern origin, and therefore of still more recent distribution.

The contrasts shown by the vegetation of neighbouring mountain groups, and even by different portions of the same group, show that a very large proportion of the Alpine flora is not easily diffused by existing means of transport; while the appearance of the same species at very distant points seems to show that its diffusion dates from a time more remote than the earliest shown on the maps before you. You will observe that whatever obstacles now interpose to limit the distribution of plants between the several mountain groups which I have mentioned, must have been intensified during the preceding geological periods, when the present continent was deeply indented by profound bays or broken up into an archipelago. Yet we find several curious instances of the presence of the same species at very remote points, such as a peculiar and very distinct Alpine gentian,* found only in the eastern

* *Gentiana pyrenaica*.

Pyrenees, the north-eastern Carpathians and in Asia Minor, and many species common to the Pyrenees and the eastern Alps, but wanting in the intermediate region.

Equally remarkable is the presence of several species of the genus *Ramondia* in the Pyrenees, in Servia, and in Thessaly, and of an allied genus represented by a single species in the Rhodope Mountains, of late so familiar to your ears. These are the only European representatives of a natural order, one tribe of which, mainly tropical American, is largely developed in the Andes, while the other, to which our outlying European species belong, extends round the whole world, chiefly within the tropics, its mountain types being mostly seen in the Himalaya. It seems probable that the distribution of such species and genera as these was originally effected by the simultaneous or successive elevation of contiguous portions of the great axis of high land that traversed the northern hemisphere in the old world, and that a vast interval of time has since elapsed during which the connecting forms have been extinguished.

I shall notice but one other point connected with plant distribution. If there be any truth in the views that I have been endeavouring to lay before you, we should expect to find that the richest floras, those showing the greatest variety and the largest number of peculiar species, would be found on those mountain masses that have remained at least partly elevated above the sea-level since a remote geological period. No doubt tracts that have been gradually elevated in contiguity with others that may have undergone subsidence would receive from the latter a portion of their vegetable inhabitants; but, as a general rule, any considerable migration of a flora would almost certainly involve the extinction of many species, and the immigrant flora would be poorer than that of the region whence it was derived. For reasons sufficiently explained by Darwin, we should also expect the utmost variety in a region where neighbouring mountain masses had for some long period been isolated, so as to form a group of islands, surrounded by marine channels sufficiently broad to prevent much mutual transport.

It is very remarkable to what an extent this anticipation is confirmed by facts. However great the changes of level may be that have occurred in the Alps, it is sufficiently certain that a portion of the eastern Alps has remained above water since palæozoic times, and highly probable that the same is true of the south-western part of the chain, these, as is well known, possessing a far richer flora than that of the central range. Professor Ramsay has well pointed out that although part of the Alps was elevated 4000 feet during the middle tertiary period, the height of the chain before that event may probably have been as great as it now is; and similar reasoning applies, with more or less force, to other elevatory movements in high mountain chains. With a very few apparent exceptions, all the mountains known to

possess rich and varied floras, with many endemic species, are portions of ancient continental masses that have been at various periods isolated, but never utterly submerged. This holds true of the Pyrenees, the Carpathians, the mountains of the Balkan Peninsula and Greece, and of the Caucasus, while the two regions possessing the richest known mountain floras, Spain and Asia Minor, were for long periods archipelagos whereon the ancient flora was preserved, but subjected on separate islands to much specific modification. On the other hand, we can explain the comparative poverty of other regions by the fact that they have been raised from the ocean within comparatively modern times. Of such, Italy and Sicily supply remarkable examples. It is not a little curious that the comparatively few endemic mountain plants of Italy are found on the Apuan Mountains, which, while the peninsula had not yet been raised from the sea, formed a small island since the early secondary period, and again in parts of the southern Apennines, whose date is probably the same. The apparent exceptions presented by Scandinavia and the British Islands are accounted for by the fact that both appear to have been almost completely submerged, during a comparatively short period, since the deposition of the newer tertiary deposits. As far as I can ascertain, the same connection between a rich flora and the preservation of ancient land holds true in the more distant parts of the world; but there are two remarkable apparent exceptions in the Canary and the Sandwich archipelagos. It seems impossible to account for the peculiarities of the floras of either group without supposing continental connection, or at least some approach to it, at a possibly remote period; but from further discussion of that, as well as many other topics, I must abstain.

Some of those present who may take the pains to consider the arguments that I have laid before you to-night, may possibly object that on very many points the evidence is incomplete, and therefore inconclusive. To that objection I can make no valid reply. During many years in which I have sought to find some solution for the problems presented by mountain vegetation, I have constantly encountered fresh difficulties, due to the imperfection of the available evidence. The tendency to draw positive conclusions from negative evidence is a constant danger for scientific men, and though I may have been on my guard, I cannot be sure that I have escaped it. It is at least certain that until our planet is far more fully known to us than it is, we are constantly liable to error when we assume that anything is not because it has not yet been observed. The task of further exploration and observation must be left to the younger generation, and such a discussion as that of this evening will not be fruitless to science if it stir up recruits to aid in the work, and increase our store of knowledge by fresh facts, whether these serve to confirm or to negative the views of its author.

Before I close, let me give you an example which may serve to show

of how much practical value a single casual observation, such as frequently falls in the way of every traveller, even in Europe, may sometimes be. There is a little flower not uncommon in Norway and the north of Scotland, called *Trientalis*, remarkable because it is the only European plant that, as a rule, has seven stamens, and a corolla with seven divisions. Twenty years ago it was known in the Alps only in two places in the north of Switzerland, and the eminent naturalist, Oswald Heer, mentions it as a plant which must have been carried to the Alps during the glacial period, but which had been unable to extend itself in the new territory. Not long after the appearance of Heer's work, while descending some steep rocks in one of the most unfrequented corners of the southern Alps, within some five hours' walk of the olive and lemon groves of the lake of Garda, I was surprised and delighted to espy the seven-rayed stars of the *Trientalis* issuing from fissures in the granite. About the same time the same species was found in a valley of Friuli, some 80 miles further east, and it is now known in one of the central valleys of Tyrol, and at another point far away in the western Alps of Savoy. Thus a few casual observations have completely altered our ideas as to the probable origin of this plant in the Alps; instead of being a modern intruder, we must now look upon this as one of the ancient families of the country, suffering from untoward circumstances, and threatened with total extinction.

If useful contributions may thus be had from comparatively well-known places in Europe, what large additions to our knowledge may we not expect from men like the members of this Society, who visit new and little-explored parts of the earth? Especially do I solicit their attention for those humble plants that dwell in the highest region of lofty mountains, springing from crevices in the rocks, or fringing with bright colour the edges of the snow-field. Every addition to our knowledge of these is a direct contribution to the ancient history of the earth, and may guide us in the difficult task of reconstructing the record of organic life. It will not diminish the interest of the search if you believe with me that these organisms, exempted from the vicissitudes to which the ancient vegetable world was exposed, may represent the earliest forms of the higher types of plant life; and even that some of the identical species that now adorn the Alpine heights may, during the inconceivably long lapse of geological ages, have looked down unchanged on the revolutions that have slowly destroyed and renewed the various forms of life on the surface of our planet.

Sir JOSEPH HOOKER proposed a vote of thanks to Mr. Ball for the very clever lecture he had delivered. That lecture had given the results of an experience and knowledge of Alpine plants which was certainly not equalled by anyone else in this country, if by anyone in Europe. To this Mr. Ball had added great research, and no small amount of constructive, and it must be acknowledged destructive, ability. His idea of correlating the general features of the Floras of Europe and Asia, and showing how much might be done by travellers in following up the question of the

distribution of Alpine plants in distant countries, was a very happy one. He had done so partly in the hope that the members of the Alpine Club, of which he was for so long the able President, would make as good use of their heads as they hitherto had done of their heels. He had shown how little was known of the constitution of Alpine plants, even of those with which we are most familiar, and many members of the Geographical Society could do essential service to the progress of science in respect of the distribution and conditions under which Alpine plants now grow, by following Mr. Ball's suggestions. He (Sir J. Hooker) felt more difficulty in dealing with the speculative portions of the lecture. On one point at least he must correct an impression which he gathered from what the lecturer had said. Neither Mr. Darwin nor Professor A. Gray nor himself had ever dealt with the problem of the birth-place of the species composing the Arctic or Alpine floras. They had been content to follow the comparatively tame process of taking the plants under the conditions in which they were now placed, and following them in their later migrations to the positions they now occupy. Everyone who lived in London knew the effects of carbonic acid gas on the human frame, and whether or not it was caused by the amount of that gas that Mr. Ball had dealt with, his speculations on the origin of the Floras in question, as affected by the presence of that gas under former conditions of the globe, had really taken his (Sir J. Hooker's) breath away. Nevertheless, there could be no question that speculations, however wild they might appear, so long as they were not in opposition to known facts, were legitimate and worthy of scientific consideration and study. No doubt the attention of palæontologists and physicists would be called to the brilliant and bold speculations which Mr. Ball had advanced, and thus much light might be thrown upon the subject of the conditions under which the European Flora had first appeared.

The **PRESIDENT**, in seconding the motion, said he should not attempt to add anything to what had been said by Sir Joseph Hooker, because remarks by such an authority could not be added to by anyone who, like himself, could only claim to have a very superficial knowledge of the subjects treated in the lecture.

GEOGRAPHICAL NOTES.

Mr. Keith Johnston.—It is our painful duty to announce the death of this distinguished young geographer, the leader of our East African Expedition, which occurred on the 28th of June, at Berobero. An account of his life and works is given in the obituary, p. 598. We are informed by Dr. Kirk that the Expedition has gone on, under the command of Mr. Thomson, and that it had passed beyond the reach of letters or messengers.

Progress of the Belgian International Expeditions.—We learn from Zanzibar that the first Belgian expedition, under Captain Cambier, has been ordered to proceed to Nyangwe in Manyema, there to form the second station, or centre of exploration and civilising influence, according to the scheme of the International Association. M. Cambier broke up his camp in Unyanyembe about the middle of April, and resumed his march towards Ujiji viâ Uyowa, south of the Gombe, but with a diminished party, as Dr. Dutrieux, his assistant, was about to return to Zanzibar. The first station is to be occupied by Captain Popelin, Lieutenant Dutalis, and Dr. Van den Hoevel, and will be situated on

Lake Tanganyika, in a bay some distance south of Ujiji. These gentlemen and their followers form the second expedition, which left Bagamoyo for the interior about the end of June. The Indian elephants under the charge of Mr. Carter, will march from Dar-es-Salaam in the direction of the Bagamoyo road, some distance inland, and will probably join the second expedition at Mpwapwa, thus forming a strong party of 250 natives and five Europeans, and crossing Ugogo together.

Dr. Mullens' Journey in East Africa.—In continuation of the note on p. 328, we learn that the Rev. Dr. Mullens, on arriving at Zanzibar, at once decided on proceeding to Lake Tanganyika in company with Messrs. Griffith and Southon. The party left Zanzibar on the afternoon of Friday, June 13th, and having landed at Saadani on the mainland, started for the interior. Letters which have been received from them dated Ndumi, June 16th, report that all the members of the expedition were in excellent health, and were well on their way westward.*

Lake Nyassa.—The Free Church of Scotland have received a letter, dated Livingstonia, April 22nd, from Mr. James Stewart, C.E., who was then in charge of the station, in the absence of Dr. Laws. He reports that on April 2nd he went northward in the *Ilala* to visit the new stations at Marenga and Kaningina, where he found that everything was progressing satisfactorily, and that European influence was being felt in the district, of which fact he gives a somewhat amusing instance. As regards rainfall, both the places mentioned are more favourably situated than Livingstonia, the following being the record up to the end of March: at Livingstonia, 28 inches; at Marenga, 60 inches; and at Kaningina, 38 inches. During the month of August it was intended that the *Ilala*, after refitting at Matopés, on the Upper Shiré, should convey another expedition to the north-west side of the lake to decide on the merits of Marenga, Ngkata Bay, or some place further north, as the site for a new settlement.

Missionary Expeditions to the Victoria Nyanza.—The Church Missionary Society have lately received intelligence that Messrs. Stokes and Copplestone reached Kagéi with their caravan on February 14th, having been thirty-five days on the road from Uyni. The journey was accomplished without loss or accident, though the Algerian Missionary Society's Expedition, which preceded them a month or so, was deserted by its porters, and lost some goods. This throws some light on the destitute condition of that Expedition mentioned on p. 513. No news had reached Messrs. Stokes and Copplestone respecting Mr. Wilson and Mr. Mackay, the heads of the Nyanza Mission, up to February 17th, the date of their letter. A telegram has been received at Alexandria from Colonel Gordon, stating that he had had letters from the missionaries

* Since the above was in type, the sad news has arrived that Dr. Mullens also has fallen a victim to the murderous African climate. He died of peritonitis, at Mpwapwa, on the 10th of July.

despatched by the Church Missionary Society to Lake Victoria by way of the Nile, dated in February from Mruli, seven days' march from King Mtesa's capital. They had met Mr. Wilson and Mr. Mackay.

Projected Journey to the Soudan.—It is stated that two Frenchmen, MM. Charles Court and Georges de Labruyère, intend to undertake a journey during the coming winter to the Soudan, chiefly for commercial purposes. Every preparation is being made to ensure the success of the expedition, and M. de Labruyère is at the present moment engaged in organising a large caravan at Biskra.

Colonel Grodekof's Route from the Oxus to Herat.—A copy of Colonel Grodekof's route-survey in 1878,* from the Patta-Kissar ferry of the Oxus to Herat via Mazar-i-Sherif, Shibarghan, Saripul, Maimana, Kalei-Nau and Kushk, has now reached this country, and is being reproduced, we believe, at the Topographical Dépôt of the War Office. He first passed through a locality frequently submerged by the overflows of the Amu-Daria, and covered with rushes and brushwood. About 35 versts from Patta-Kissar lie the very extensive ruins of the ancient town of Siah-gird. The country about Mazar-i-Sherif is carefully cultivated; at a distance of 3 versts is the Takta-pul fort, with gun factories, cannon foundries, and manufactories of swords, knives, and felt helmets. The valley of the Saripul River is considered very unhealthy; the town itself occupies a wide extent on both sides of the river, and has a citadel in the centre; the population consists of 3000 Uzbeks. Between Saripul and Maimana the road passes through a rocky defile $12\frac{1}{2}$ versts long. Beyond the Mirza-aulang Valley lies a very steep pass leading over the water-parting between the Saripul and Sangalak river basins. Maimana is surrounded by a wall 3 fathoms high, and contains 2500 Uzbeks. From the latter place to Kalei-Nau Colonel Grodekof's route appears to coincide pretty closely with that of Vambery's, but from Kalei-Nau he diverged westward and approached Herat by the Kushk route. The entire distance from the ferry at Patta-Kissar to Herat was 700 versts.

Oshanin's Expedition.—The 'Turkestanski Vedomosti' says that information regarding the least known parts of Central Asia is being gradually but uninterruptedly collected. Thanks to the researches of Sévertseff, the Pamir is no longer a *terra incognita*; Karateghin has been visited by Oshanin, and Darwaz, hitherto known only from hearsay information, will this year be explored. Two travellers, Captain Herman of the Staff Corps, and Smirnof, a botanist, will pass this summer in the mountainous districts of Karateghin. They will both travel at their own expense. Herman takes with him the necessary instruments for a route-survey and for barometrical observations, while Oshanin, who has made a special study of the flora of Ferghana and its surrounding mountains, will no doubt bring back vast botanical materials. From a small

* Vide 'Proceedings' for June, p. 387.

pamphlet on scientific expeditions in Turkistan in 1878, kindly communicated to our Society by General Kaufmann, we learn that Oshanin's object last year was to gain an acquaintance with the regions south of the Zerafshan and Ferghana districts, viz. Hissar, Karateghin, and the western part of the mountainous country on the Upper Oxus. He had intended crossing from the head-waters of the Muk-su (or Muk River), a confluent of the Surkh-ab (or red river), into Shughnan (or Shighnan), one of those small hill states nearest to Badakhshan, which owe their political importance to their proximity to our Indian frontier, and making his way to Lake Victoria (Wood's lake), thus uniting English and Russian surveys; he had also the intention, had circumstances permitted, of examining the passes leading from the great Pamir to the basin of the Indus. Defeated in the main object of his journey by the difficulties of the road, Oshanin returned to Ferghana last autumn with a rich supply of topographical and other information, of which we are promised the publication in the course of the year. Among the most remarkable of his discoveries is that of a great ridge of mountains, extending first along the left bank of the Muk-su and then along the left bank of the Surkh-ab, and forming a natural boundary between Karateghin and Darwaz. Below Garm (or Gharm) this ridge is pierced by the Khuliab, a confluent of the Surkh-ab, and known in its upper course as the *Wakhia*, a name applied in some of our maps to the district immediately south of Karateghin. In the meridian of Garm the peaks of this range attain the limit of perpetual snow, but they are loftiest opposite the confluence of the Muk-su with the Surkh-ab; here their approximate altitude was estimated by Oshanin to be not less than 24,000 feet. He has named this range after the czar Peter the First, the foremost of Russian monarchs to promote the exploration of Central Asia. Another interesting feature in this country is the enormous glacier which feeds the Sel-sai, one of the three sources of the Muk-su flowing from south to north. This glacier is 11 miles from the mouth of the Sel-sai, and extends for upwards of 14 miles, with a width at its base of rather over a mile. At its south-eastern extremity, in a narrow gorge closed on the right by mountains and on the left by the wall-like side of the glacier itself, measuring here 270 feet in height, the Sel-sai unites with another stream—the Baland-kiyik—flowing from east to west. This glacier is one of the largest in Central Asia, and has been named "Fedehenko," after the well-known Russian traveller, who lost his life on the Col de Géant, Mont Blanc, during a tour in Switzerland. It was in ascending the Baland-kiyik that Oshanin met with such formidable obstacles to his further progress; and these, combined with the loss of baggage animals and the sickness of his Cossack escort, brought on by fever contracted during their passage through the notoriously unhealthy Hissar, compelled him at length to return. From these Russian explorations, it would appear that the late Mr. Shaw was

not far wrong in saying that we should find the Pamir to be traversed from east to west by hog-backed ridges, between which the drainage flows away.* Whilst on the subject of Russian exploration, let us give a brief outline of Sévertseff's explorations last year in the regions of the Pamirs. His expedition comprised M. Kushakévitch, a botanist and entomologist, M. Skassi, a topographer, an assistant collector, and an escort of Cossacks, varying in number from six to thirty, as circumstances required. They set out early in May for the eastern Namangan Mountains, and, ascending the Naryn, explored the hilly region between the rivers Uzun-akhlmat, Naryn, and Susanier, afterwards making excursions in various parts of the Ferghana Valley. On the 1st July they made a fresh start for the Alai and traversed its entire extent, their route leading them across the head-waters of the Kashgar River and the basin of Lake Kara-kul. On the 4th August they entered an entirely unexplored part of the Pamirs, as they made their way from the Kara-kul Lake up the northern Ak-Baital River (marked Chon-su on some maps), then along the southern Ak-Baital to Rang-kul. Ascending the Ak-su, they explored the whole of the Alichur Pamir as far as Yashil-(or Yeshil) kul. On their return journey they visited the south-western part of the Kara-kul basin, and returned to Gulja about the middle of September. In October they made an excursion up the Tara to the summit of the Tuz-ashu Pass, and from the 1st November Sévertseff collected zoological specimens in the neighbourhood of Gulja and the Ferghana Valley. The results of this expedition were: a topographical survey of much new ground, the astronomical determination of twelve points, a series of levels connecting Lake Kara-kul with the Ferghana Valley (Kokand), 500 barometrical observations, and extensive geological, botanical, and zoological collections. Skassi also took photographs of the most remarkable places. Thanks to this expedition, it may now be said that most of the Pamir region has been fully explored.

Exploration of the Sanpo River in 1877.—Further details regarding the survey of this river by a native explorer, of which mention is made in our April number, p. 273, have now reached us. The explorer was employed under the immediate instructions of Lieutenant Harman, who has not yet had time, owing to other more pressing duties, to complete the report and maps relating to this remarkable journey. The following is therefore to be regarded as only a provisional account. The surveyor, N—m—g, was sent to Chetang, the position of which had been determined by Pundit Nain Singh in 1875, with instructions to explore the course of the Sanpo River downwards for as great a distance as practicable. Crossing to the north bank, he followed it eastward for a distance of about 30 miles down to the point where it is joined by a small river

* See Yule's essay in Wood's 'Oxus,' p. lxxxix., and compare Ravenstein's map in 'Ocean Highways,' August 1873, and the map accompanying Major Trotter's paper in the 'Journal R. G. S.,' vol. xlviii.

called the Mikehu from the north-east; here he had to leave the main stream and make a considerable detour up the Mikehu Valley and over the Lungla Pass, on the range which forms the eastern boundary of the Lhasa basin, then down a valley passing two monasteries, viz. Chokorgye and Thakpo. At the town of Gyatsa-jong he struck the River Sanpo again, which winds its way through the mountains for a distance of 20 miles in the interval which he had passed by a detour of more than 50 miles. About 30 miles below Gyatsa-jong he crossed over to the right bank of the river near Thak Nong-jong, which is situated near the junction of a river from the south which is said to pass by the town of Tsari which Lieutenant Harman believes to be identical with D'Anville's Chai. As far as Gyatsa-jong, the course of the Sanpo is fairly in accordance with Pundit Nain Sing's map of the country traversed by him between Lhasa and Assam. Nain Sing had seen the course of the river for a distance of about 30 miles below Chetang, and he had been informed that from that point onward it flows in a south-easterly direction into Assam.

We now learn that it does flow in a south-easterly direction, but only for a short distance beyond Gyatsa-jong, after which its course is due east for some 50 miles, and then north-east for about 80 miles. The river reaches its most northern point near the intersection of the meridian of 94° with the parallel of 30° , about 12 miles to the north-east of a place which the explorer calls Chamkar, and which Lieut. Harman identifies with D'Anville's Tchamca. After attaining its most northern point, the river turns due south-east, reaching Gya-la Sindong in 15 miles, beyond which place N—m—g was not able to follow it. There, however, he saw that it flowed on for a great distance, passing through a considerable opening in the mountain ranges to the west of a high peak called Jung-la. Beyond this opening the river was said to pass through a country inhabited by savages into a land ruled by the British Government. Assuming the position of Gya-la Sindong to have been fairly well determined by the explorer, its direct distance from the highest point hitherto fixed on the Dihong River in the course of the survey operations in Assam is only about 100 miles. The height of Gya-la Sindong was found by the explorer to be 8000 feet, showing that the river had fallen about 3500 feet in 200 miles of distance from Chetang, and leaving a descent of 7000 feet for the distance of 160 miles down to the junction of the Dihong River with the Brahmaputra; this does not give an excessive slope compared with other Himalayan rivers. One of the most interesting results of the present exploration is that it affords an explanation of the probable source from which the Subansiri River draws its large volume of water. The fact of its volume being so large, coupled with the erroneous information derived from Nain Sing as to the supposed south-easterly course of the Sanpo below Chetang, had given rise to a conjecture that the Subansiri was the recipient of the

Sanpo. That this conjecture is erroneous has been shown by Lieut. Harman's recent operations for measuring the discharges of the principal affluents of the Brahmaputra. These operations indicate that the volume of the Dihong is from twice to three times as great as that of the Subansiri, so that of the two the Dihong has a far better claim to be the recipient stream. Still the difficulty remained of accounting for the large discharge of the Subansiri from so small a drainage area, and this difficulty is now removed by the discovery inside the great bend of the Sanpo of a considerable area, which may well be one of the two principal basins of the Subansiri and its affluents.

Count Széchényi's Expedition to Lob-Nor and Tibet.—In our report of the Berlin Geographical Society's proceedings on page 535, we gave some details respecting this Hungarian traveller's progress, which Dr. Nachtigal quoted from a communication to the Austro-Hungarian Consul at Shanghai. Count Széchényi therein reported his arrival at Lanchow-fu, the capital of the province of Kansu in North-Western China, adding that he was then about to start for Suchow-fu, twenty-five days' journey distant, on the western frontier of the province. We now learn from the 'North China Herald,' of Shanghai, that Count Széchényi reached Suchow-fu in safety, without having met with any noteworthy impediment during the whole of his long journey across North China. At this frontier town he had an interview with Tso Chungtang, the viceroy of the province, who has achieved a considerable reputation during recent military operations in Chinese Turkistan. Count Széchényi requested a safe conduct to Lob-Nor, and in support of his request exhibited his passport from the Chinese Foreign Office, as well as a letter of recommendation which he had brought from Peking. The viceroy alleged the dangers of the road, and declared his inability to afford protection to the Expedition; in the face of the passport he could not stop the European members, but he refused to permit any Chinese to accompany them. Thus ends one of the most hopeful attempts to reach Lob-Nor from the side of China, for under the circumstances, and bearing in mind the lateness of the season, Count Széchényi reluctantly gave up the proposed expedition across the Kum-Tagh to the mysterious lake. He hoped, however, shortly to be able to start for Koko-Nor, and then to make his way to Lhassa. It may not be out of place to call the attention of travellers in China, who may wish to cross the frontier, to the fact that, when procuring a special passport at Peking, they should formally request the Chinese authorities to enter on it the names and descriptions of their Chinese servants, as it will then be next to impossible for the local officials to hamper their movements.

North Australia.—As the attempts hitherto made to develop the resources of the Northern Territory of South Australia have not as yet

proved very successful, it is interesting to learn that considerable progress is being made in the cultivation of cotton in the neighbourhood of Port Essington. The plantation where the experiment is being made is stated to be well situated close to the sea-coast, where plenty of native labour is available.

New York State Survey.—In presenting their third Report (for 1878) to the New York Legislature, the Commissioners state that the economy with which the small appropriation (\$15,000) has been expended, the rapidity with which the survey has been carried into the western part of the State, and the novelty and importance of its geographical results, exceed their most sanguine expectations. The field-work of the year was principally on the central belt of triangles, which is to extend from Albany to Buffalo. Thirty-one prominent points have been marked with granite posts, and their distance and direction from one another determined with the utmost precision, as well as their latitudes, longitudes, and elevations. The measurements embrace an area of about 2000 square miles in one of the most populous parts of the State, containing two important cities and nearly 200 villages and hamlets; yet every one of these towns is misplaced from one to two miles on all existing maps. In evidence of the excellent and useful nature of the work done by the Survey, the Director, Mr. James T. Gardner, remarks:—"Colorado was not a greater surprise to me than has been the structure of my native state. In the study of the origin of some of the most remarkable features lie untrodden tracts of knowledge which are yet to awaken deep interest. The configuration of a part of Central New York is as unique and as unknown to science as that of any part of the Rocky Mountains." The Report is accompanied by a map, tables of preliminary geographical positions, &c.

Mountain Exploration in Dominica.—In a suggestive article on mountain climbing in the West Indies, in the 'Colonies and India,' we find the ascent recorded of a mountain in Dominica which is believed to have never been explored before. Behind the town of Roseau there rises a lofty peak, known as Micotrin, or the Lake Mountain, and further north again is a lofty ridge, divided into three separate heads, and known as Morne Trois Pitons, the respective heights of these peaks being stated as 4528 feet, 4552 feet, and 2672 feet. It was one of these which was scaled for the first time by two Englishmen, Messrs. E. Marshall and Edmund Watt, accompanied by four inhabitants of Landat. The foot of the centre *piton*, or peak, at an elevation of about 1800 feet above the sea-level, was reached about 9 A.M., and an hour later, when the party had attained an elevation of over 2000 feet, heavy rain began to fall, and clouds of mist enveloped and hid the upper part of the mountain. For a considerable distance they were able to follow a wild-pig track, but as they ascended, they had to leave this, and to cut their way through dense

vegetation and scrub, which covered the steep face of the western side of the mountain. The summit was reached at 1 P.M., when, instead of the mountain terminating in an almost pointed peak, as appeared to be the case from below, the party found that the top was nearly flat, about ten acres in extent, and covered with such dense vegetation that they were obliged to climb through small openings and to the tops of the small trees in order to obtain a view of the country below. Violent gusts of wind swept over this small plateau, rendering it difficult to stand, notwithstanding the protection afforded by the dense vegetation. No water could be found on the summit, but in the descent a small stream was discovered, which was believed to be one of the feeders of the Boeri River.

International Congress of Americanists.—The third session of this Congress, which last met at Luxembourg in 1877, will be held at Brussels, from September 23rd to 26th. The object of the Congress being to contribute to the progress of ethnographical, linguistic, and historical studies relating to North and South America, especially in regard to the period prior to Christopher Columbus, the following programme has been arranged for the coming meeting:—

HISTOIRE :—Indiquer parmi les faits qui composent l'histoire de l'empire Mexicain : 1° ceux qui sont attestés par des documents indigènes précolombiens ; 2° ceux qui ont été recueillis dans la tradition orale par des écrivains de race Mexicaine ; 3° ceux qui ont été recueillis dans la même tradition par les Européens.—Des Calpullis Mexicains, de leur administration, de leur origine et du principe communiste qu'ils impliquent.—Examen critique du *Popol Vuh*.—Comparaison des trois royaumes de Cuzco, de Trujillo et de Quito qui formaient l'empire des Incas, au moment de la conquête. Différences que présentaient leur religion, leur législation, leur langage, leur architecture, leurs mœurs, etc.—Ce que l'on sait de la Norombègue.—Colonisation des embouchures du Mississippi.—Progrès de la cartographie Américaine durant le xvi^e siècle.

ARCHÉOLOGIE :—Caractère des dessins dont sont ornés les objets en pierre provenant du détroit de Behring.—Valeur religieuse et emblématique des divers types d'idoles, de statuettes et de figures que l'on trouve dans les tombes Péruviennes ; classement des Conopas par types.—Classement des produits industriels et artistiques des indigènes de la côte du Pacifique, depuis l'isthme de Panama jusqu'au désert d'Atacama.—Antiquités des divers États de la domination Canadienne.—De la tradition de l'homme blanc et du signe de la croix.

ANTHROPOLOGIE ET ETHNOGRAPHIE :—De l'homme tertiaire en Amérique.—De l'influence du milieu Américain sur la race blanche.—Classification ethnologique des indigènes de la Nouvelle Grenade et de l'isthme de Panama.—Des races métisses au Brésil.—Les indigènes de l'Acadie lors de l'arrivée des premiers explorateurs Français.—Des mounds situés à l'Ouest du Missouri et dans les possessions Britanniques de l'Amérique du Nord.

LINGUISTIQUE ET PALÉOGRAPHIE :—Inscription de Cook découverte par le Rév. J. Gass.—Déchiffrement des inscriptions Mayas.—Les Quippos Péruviens ; réunir le plus de données possible sur ce procédé mnémonique.—En quoi la langue Esquimaude diffère-t-elle grammaticalement des autres langues de l'Amérique du Nord ?—Comparaison de l'Aymara, du Quichua et du dialecte de Quito.—Que faut-il entendre

par les caractères de polysynthétisme, d'incorporation, d'encapsulation et d'holographisme que l'on attribue aux langues Américaines?—Indiquer les langues non Américaines dans lesquelles existerait la distinction du pluriel inclusif et du pluriel exclusif.

The Loochooan and Aino Languages.—As a pendant to our note on the Loochoo Islands (p. 210), and as having some little bearing on that respecting the Japanese island of Yesso (p. 275), we cite a few particulars on the above subject from a memorandum which Mr. W. G. Aston, of Her Majesty's Legation at Yedo, has contributed, through Mr. R. N. Cust, to the August number of the 'Church Missionary Intelligencer and Record.'—The language spoken in Loochoo is merely a dialect of Japanese, differing from it in about the same degree as Lowland Scotch does from English. It is not a corruption of Japanese, but a genuinely independent form of the language, and contains words which are obsolete in the modern language; it resembles the dialect spoken in the province of Satsuma, which is almost unintelligible to natives of other parts of Japan. The Loochoo dialect is not cultivated as a literary language, Chinese or Japanese being used for literary purposes; but little attention is paid to letters, and there is neither printing-press nor book-shop in the islands. Mr. Aston uses the word *Aino* as a convenient general term for the language which in a great variety of dialects is spoken in Yesso, Saghalin, the Kurile Islands, Kamchatka, and, he believes, in a small district on the mainland of Asia, inhabited by a tribe called the Santals(?) or Sandans(?). *Aino* means "man," and is used by these tribes to distinguish themselves from other nations. There are several dialects spoken in Saghalin, and at least two in Yesso, one being that used in the valley of the River Ishigari, in which is situated Sapporo, the newly-built capital of Yesso (*ante* p. 275). Mr. Aston says that little is known of the affinities of *Aino*, but it appears to him to have no close relationship with Japanese, and he would be inclined to exclude it from a class which would comprise Japanese, Corean, and possibly one or two others.

Obituary.

Keith Johnston.—By telegram and subsequent mail from Zanzibar we receive from Dr. Kirk the disastrous news that the leader of our East African Expedition is dead. He succumbed to dysentery on the 28th of June at Berobero, distant about 120 miles inland by road from Dar-es-Salaam. Thus, almost at the threshold of a journey undertaken with infinite enthusiasm and high resolve, and commenced under the happiest auspices, we lose the accomplished geographer, by whose labours, had he been spared, geographical science would have so greatly benefited.

Our regretted young colleague was the only son of the eminent geographer, Dr. Alexander Keith Johnston, of Edinburgh, the author of the 'Physical Atlas,' the 'Royal Atlas,' and other equally well-known and successful works. He was born on the 24th of November, 1844, and received the rudiments of his education at schools in

his native city. But he was also carefully instructed in geography by his father from his earliest years; and on leaving school he received a further special training under private tutors, among others Mr. Sang, in mathematics. In 1866 he came to London, and (in April) entered the Geographical Establishment of Mr. Stanford, where he remained until July 1867, acting as superintendent in drawing and engraving, under the direction of the experienced geographer Mr. Trelawny Saunders, to whose professional instruction he afterwards publicly expressed his indebtedness. During this time he assisted, among other things, in preparing the 'Globe Atlas of Europe,' and the series of maps illustrating Murray's Handbook for Scotland. At the end of July 1867 he went to Germany, chiefly for the purpose of perfecting himself in the language; but also with a view to improving his geographical knowledge and practice. He spent most part of his time whilst in this country at Leipzig, where he studied under Dr. Lange, but he visited also Berlin and Gotha, at which latter place he stayed only a short time, and was conducted over the famous Establishment of Perthes by Dr. Petermann. The experience and knowledge he thus acquired were of the greatest value to him subsequently. He not only became a sound German scholar, but inbibed the German habit of thoroughness and painstaking in study and work, qualities which are apparent in all he afterwards did.

On his return in February 1868, he pursued his profession of geographer under his father at Edinburgh for eighteen months, that is, to the end of June 1869. He then came to London and took charge of the Geographical Department of the firm of W. & A. K. Johnston. In 1870 he published his 'Lake Regions of Central Africa,' with map, a small work which resuming as it did in an accurate and intelligent manner the scattered results of recent explorations, was found most useful, and was much quoted at the time. A copy reached Dr. Livingstone, then in the far interior, who alluded humorously in one of his letters to the "geographical acumen of Keith Johnston secundus." He also published a little volume entitled 'Surface Zones of the Globe,' which was a handbook accompanying his physical map of the world on Mercator's projection. In 1871 his father died, within little more than a month after he had received in person, at the hands of our President, Sir Bartle Frere, the Patron's Gold Medal of the Society in recognition of the high merits of his numerous geographical works. About this time young Keith evinced a distaste for sedentary work, a long felt desire to accomplish active work in the field, as a traveller and explorer, developing itself now into a passion. He was one of the numerous candidates who offered themselves to the Council of the Society for employment on the Livingstone Search and Relief Expedition, organised in the autumn of 1871; and it was only under reserve that he then took the advice of his friends and applied himself for a time to quiet work. A vacancy occurring soon afterwards in the map department of our Society, he engaged himself as assistant curator, a post which he occupied, with signal benefit to the Society, from April 1872 to November 1873; during which time he compiled and drew most of the fine wall maps in illustration of papers at our Evening Meetings and also some of the best maps in the 'Journal.' An opportunity then offered to gratify his taste for scientific travel, in the expedition planned by the Government of Paraguay of that period, to survey the little known parts of their territory. Johnston engaged himself as geographer, and was employed until May 1875 in this undertaking full of hardship and difficulties—difficulties not a little aggravated by the impecuniosity of his employers, which accompanied a change of government very soon after his arrival in the country.

Mr. Johnston did not publish a complete account of his journey, but the paper read by him before the Geographical Section of the British Association at Bristol in 1875, published, with a map engraved from his own drawing, in the 'Geographical Magazine' for the same year, and his 'Notes on the Physical Geography of Para-

guay' in the 'Proceedings' of our Society, vol. xx. (p. 494), bear witness to the thoroughness with which he carried out his mission. They contain a vast mass of accurate and useful information, and the Physical Geography paper especially may be cited as a model study in this department of our science.

In the interval between his return from Paraguay and departure on his ill-fated journey to East Africa, he was busily engaged in independent geographical work in London. Amongst other works produced during this time was the volume on Africa forming part of Stanford's 'Compendium of Geography and Travel' (1878); and the well-known Library Map of Africa, published by his relatives, Messrs. W. & A. K. Johnston. He was also engaged down to the time of his departure from England, and even during the voyage out (for part of the manuscript was posted home from Aden) on another work of similar importance, entitled 'Physical, Historical, Political, and Descriptive Geography,' which is about to be published by Mr. Stanford.

When the African Exploration Fund Committee last year decided on despatching a small expedition to the head of Lake Nyassa, the zeal and abilities of Mr. Johnston pointed him out as the most eligible candidate for employment as leader of the party. Not the least of his recommendations was his evident physical health; the hardships of his Paraguay journey having had no injurious effect, but appearing rather to have strengthened a naturally strong constitution. He left England in November last, and on his arrival in East Africa spent the time before the commencement of the caravan season, i. e. from December to May, as required by his instructions, in preparatory work at Zanzibar and in the neighbouring mainland. During this, the most unhealthy time of the year, the rainy season, he appears not to have suffered from illness in any way, and his letters home were redolent of enjoyment of the country and his work. The reports and maps connected with this preliminary work, which have now been published in these pages, were a sure promise of great things to come when he should have traversed the unknown regions of the interior, and now only make us regret his loss the more.

The "Havildar."—We regret to hear of the death at Jalalabad, of cholera, of Subadar Hyder Shah, of the Bengal Sappers and Miners, better known to geographers under the name of the "Havildar." This adventurous traveller was first brought to the notice of the late Colonel Montgomerie, as a likely man for exploring work, by Lieutenant-Colonel Mansell, Commandant of the Sappers and Miners. The Havildar's first undertaking, after having gone through the necessary training, was to carry a route survey from Peshawar through Swat, Bajaur, Dir and Chitral, over the Nuksan Pass leading across the Hindu Kush Mountains, into the Oxus basin to Faizabad, and thence back by the Dora Pass to Chitral, and so home. This survey was 286 miles in length, over entirely new ground; it accounted for the geography of about 13,000 square miles of *terra incognita*, and was checked by twenty latitude observations at five places. The observations for height by means of boiling point were meagre. But generally speaking, the Sapper's work satisfactorily stood tests applied, and his pluck and endurance were worthy of all praise.

In 1872 the Havildar was employed in making a route survey from Kabul to Bokhara, the result being that the positions of Balkh and Karshi had to be altered, and that some interesting additions were made to our knowledge of those parts. Of this journey no account has been published, as the greater portion of the route traversed had previously been described by others. But we feel sure we are only echoing the feelings of all true geographers when we say that its publication would be most eagerly welcomed.

In 1873 the Havildar, with two companions, started from Peshawar in the disguise of a travelling merchant, and, proceeding by the Abkhana route, passed through

Jalalabad and reached Kabul on the 1st of October. The Havildar crossed the Hindu Kush by the Sar-ulang Pass, the same from which Wood had been driven back by a snow-storm, and thence having journeyed northwards to Faizabad, explored a great deal of unknown territory in Badakhshan, Darwaz, Kolab, and Kubadian, crossing and recrossing the Oxus River four times. His route surveys on this occasion extended over 778 miles.

From the above it will be seen that Hyder Shah's services to geography are most conspicuous, and among the Indian Native explorers second only to those of the Pundit Nain Singb. They undoubtedly call for some public recognition of their value.

CORRESPONDENCE.

The Aurora Borealis.

THE NASH, NEAR WORCESTER,

July 18th, 1879.

SIR,—Although the conjecture hazarded more than 160 years since by Halley, that the Aurora Borealis was a magnetic phenomenon, has acquired empirical certainty from Faraday's discovery of the evolution of light by magnetic forces, as well as from more recent observations, the following extracts, translated from a letter written by Herr Pastor emeritus H. M. F. Esmark, may perhaps be considered interesting, Herr Esmark having observed the meteorological conditions attending the display of the polar lights for many successive years:—

"The Aurora is neither seen during extreme cold or northerly winds, but appears when an ordinary Arctic temperature is raised by southerly and westerly winds, and is generally followed by snow. In the south-eastern part of Norway it seems to be especially caused by south-easterly winds, which are there very moist, and rather warm. Its appearance is always accompanied by a falling barometer. In my opinion, the phenomenon is due to the following causes. When a wind laden with warmth, moisture, and electricity comes in contact with a body of cold air, the moisture is converted into snow, the warmth and electricity are thereby released, and the Aurora is the result of the disturbance. The northern lights cannot occur in very high latitudes, because the warm moist air is cooled long before it reaches them."

In this way Herr Esmark would account for the splendid appearance of the Aurora in northern Norway, where the sea winds, bringing warmth, moisture, and electricity from the ocean, are met by cold land winds from the interior. MM. Lottin, Bravais, and Siljerström, who spent a winter at Bosekop in Alten (lat. 70° N.), saw the northern lights 160 times in 210 nights. The most vivid Aurora that I ever saw near Alten was towards midnight on the 12th of November, 1874. The flickering lights played about the masthead so like lightning that it was difficult to believe they were harmless. We had no snow, however, till the evening of the 14th, as we were entering Tromsø harbour, and during the discharges of light the compass-needle was wildly erratic. The determination of the chemical elements involved, by means of spectrum analysis, is by no means the least of the numerous scientific results to be derived from Arctic exploration.

Your obedient servant,

GEORGE T. TEMPLE.

To the Editor of the 'Proceedings R. G. S.'

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

SHEFFIELD MEETING, 1879.

The British Association for the Advancement of Science held its annual meeting, the forty-ninth, this year at Sheffield, from the 20th to the 27th of August. The Geographical Section was organised as follows:—

PRESIDENT:—Clements R. Markham, C.B., F.R.S., Secretary R.G.S.

VICE-PRESIDENTS:—Rev. Canon Rawlinson, M.A.; Sir Rawson W. Rawson; Lieut.-General Sir H. E. L. Thuillier, F.R.S.; Captain E. H. Verney, R.N.

SECRETARIES:—H. W. Bates, Assistant Secretary R.G.S.; C. E. D. Black; E. C. Rye, Librarian R.G.S.

At the commencement of the proceedings, Thursday, August 21st, the President delivered the following address:—

I PROPOSE to open the proceedings of this section by attempting to place in a clear light the objects and aims of geographers, and the position which their science holds relatively with reference to the other sciences, and positively as a distinct body of knowledge with defined limits.

Geography is a knowledge of the earth as it is, and of the changes which have taken place on its surface during historical times. These changes explain to us the laws according to which similar changes are now taking place around us. The subject may be considered from various points of view; but my present endeavour will be to introduce to you, through the remarks I propose to make, the papers that will come before you to-day and at our subsequent meetings. I shall try to do this by explaining the practical uses of geographical knowledge, and its importance to us in almost every occupation in which we may be engaged.

Our first work as geographers is to measure all parts of earth and sea, to ascertain the relative positions of all places upon the surface of the globe, and to delineate the varied features of that surface. This great work has been proceeding from the first dawn of civilisation, and it will probably be centuries longer before it is completed. Geographers and explorers, surveyors and geodesists, of each generation, work their allotted time, gradually increasing the stock of human knowledge, by enabling other sciences and other branches of inquiry to make parallel advances. For they are all dependent on the accurate measurement and mapping of the earth. Locality is the one basis upon which all human knowledge must rest. Arts, sciences, administration, commerce, depend upon accurate geographical knowledge; and as that knowledge becomes more extensive and more exact, so will every other human pursuit gain increasing light and truthfulness.

We are still very far indeed from an accurate scientific geographical knowledge of even the most civilised countries, while by far the largest portion of the earth's surface is inadequately surveyed, and a smaller, though far from inconsiderable, part is unsurveyed or entirely unknown. In the division of labour, the geodesist produces the accurate large-scale maps which are necessary in thickly populated countries, the topographical surveyor furnishes less exact maps of more thinly peopled and less civilised regions, while the trained explorer forces his way into the unknown parts of the earth.

From the labours of these three classes of workers we, in this generation, and

our descendants for many generations to come, must be content to derive our knowledge; but in the fullness of time the whole earth will be measured and delineated as Hallamshire is now. It is to the furthering of this great work that the geographers of each age devote their energies, and its advancement will increase in rapidity, because, as men become better instructed, there will be more geographers.

The construction of large-scale maps on rigorously accurate principles has as yet made inconsiderable progress. It is only in the countries of Europe, in India, and some of our colonies, and in the United States that it has been commenced. But it is very far from being completed anywhere, and the people of Sheffield have had this fact brought home to them within the last year; for the Memoir on the Yorkshire Coal Field, published by the Geological Survey in 1878, was obliged to stop short with the limits of the county, an artificial and inconvenient line which leaves the southern portion of the field undescribed, entirely because the 6-inch survey had not yet been extended over Nottinghamshire and Derbyshire. This circumstance strikes us in two ways. It reminds us that geographical work is far from being completed even in the most populous and civilised parts of our own country; and it also brings the fact home to us that the progress of other sciences is dependent upon the advance of geography.

Where the trigonometrical surveys have not been commenced, we have only those maps which are based on positions fixed by astronomical observations, on cross-bearings and chained distances, and which I call (to distinguish them from the results of trigonometrical surveys) the topographical maps. One of the oldest and most interesting of these maps is the famous atlas of the Chinese Empire constructed by the Jesuits between 1708 and 1718. But we are also dependent on such maps for our geographical knowledge of all Asia except India and Palestine, of the Eastern Archipelago, of all Africa and South America, and of the greater part of North America.

Accurate maps are the basis of all inquiry conducted on scientific principles. Without them a geological survey is impossible; nor can botany, zoology, or ethnology be viewed in their broader aspects, unless considerations of locality, altitude, and latitude are kept in view. Not only as the basis of scientific inquiry, but also for the comprehension of history, for operations of war, for administrative purposes, and for the illustration of statistics, the uses of accurate maps are almost infinite. M. Quetelet, in one of his well-known letters, declared that such graphic illustration often afforded immediate conviction of a point which the most subtle mind would find it difficult to perceive without such aid. Maps both generalise and allow of abstraction. They enable inquirers at once to detect and often to rectify errors, which, if undetected, would affect results and throw calculations into confusion. As an example of the use of maps for administrative purposes, the series constructed by Mr. Edward A. Prinsep in India is worthy of notice. They showed the agricultural tribes of a special district arranged according to occupancy of land, political and fiscal divisions, physical features and zones of fertility, productive power as influenced by rain or aided by irrigation, different kinds of soils, acres under different kinds of produce, and lines of traffic. Another most instructive series displays the State irrigation canals acting on improvable waste lands, the depth of wells, the rainfall and zones of drought, and the parts of the country already irrigated. As another noteworthy instance of the use of maps for statistical illustration, I may mention the interesting '*Carte agricole de la France*,' by M. Delesse, which not only shows the extent of arable, meadow, and vine lands, and of woods, but the relative value of land by shades and contour lines of equal revenue. The idea has been adopted by Mr. Ralph Richardson in his map of Mid-Lothian showing the annual

rentals by colours; and of course the colours also indicate the positions of barren mountains, of fertile valleys, and of centres of population. Such maps ought to be far more extensively used than is now the case; for in no other way can economic and industrial facts be so lucidly and clearly, as well as so rapidly, impressed on an inquirer's mind.

The third division in which geographical delineation is classed is that comprised in the labour of pioneer-exploring and discovery. This branch of our subject excites the most interest, because the heroic devotion and gallantry of our travellers is a source of just pride to the nation; and because their perils and hardships, their adventures and discoveries, surround them with a halo of romance. Yet these romantic associations are not confined to the pioneers of geography. Though less known, they equally belong to the more scientific geodesist. In the whole range of exploring narrative there is nothing more calculated to excite admiration, nothing more touching, than the devotion of Colonel Lambton, the first superintendent of the Great Trigonometrical Survey of India, the old man who was absorbed in his great work for half a lifetime, who wasted away from exposure and hardship, but who to the last brightened up to renewed animation and vigour when the great theodolite was before him, and who died at his post in a wild part of Central India. This was sixty years ago, but quite recently the equally heroic death of Captain Basevi was recorded. At 17,000 feet above the sea, in a temperature below zero, and protected only by a light tent, this martyr to science was engaged in the delicate operation of swinging the seconds pendulum. One morning, when gallantly striving to rise from a bed of suffering, and to recommence work, he died. Nor do these names stand alone. Assuredly, the more scientific surveyors run equal risks, and deserve equal recognition with their exploring brethren. Still the interest justly attaching to new discoveries naturally commands most popular applause, and the importance of opening up an unknown country cannot well be exaggerated.

In this glorious field there are still harvests to be reaped through the bravery and endurance of future travellers. In spite of all that has recently been done in Africa, there is a vast unknown tract to be discovered. In Asia, in New Guinea, in Sumatra and Borneo, in South America, wide regions also remain unexplored. Above all, the greatest problem of this age awaits solution in the far north, and will call forth the best scientific ability, and all the highest qualities of our naval explorers.

Every year, new regions are brought within our knowledge, and we are able to welcome the adventurers home, and to add them to the list of geographical worthies. But, with regard to many explorers, there can be no doubt that much more valuable information might be obtained than is now the case. Men, with various avocations, traverse unexplored or little known countries, who from want of previous training, are unable to lay down their routes or to observe with scientific accuracy and intelligence. There are naval and military officers, missionaries, consular agents, colonial officials and planters, engineers, telegraphers, collectors, and sportsmen or persons merely travelling for pleasure, many of whom are led, by business or curiosity, to penetrate into regions of which little is known. It is most important that there should exist, in this country, the ready means of furnishing the necessary training to such explorers; and the subject has recently received serious consideration from the Council of the Royal Geographical Society.

It has been resolved that a course of instruction shall be supplied by the Society to all who are about to visit unknown or little known countries, and who desire such training. As a preliminary measure, the present arrangement is to give such instruction as will enable the pupil to fix positions by astronomical ob-

servations, and to lay down his route; but this is only a beginning, and it is to be hoped that, in due time, such a course of instruction will be provided as will enable an intelligent traveller to observe with scientific accuracy, and to bring home really valuable results in various branches of inquiry. It is very desirable that this resolution of the Geographical Society should be widely known, and I trust that the local members of this Section will cooperate so far as to bear in mind that this aid is offered by the Geographical Society, when the intention of any native of Hallamshire to visit a distant region comes to their notice. Incalculable good may be done to the cause of geography by a system which will have the effect of making every traveller a scientific and intelligent observer.

The surveying and mapping of the ocean is only second in importance to that of the land; and this work also divides itself into three sections, namely, the coasts surveyed, the coasts partially surveyed, and the unsurveyed coasts. Hydrography will not be completed until all the coasts in the world are included in the first section, which is now very far indeed from being the case. Yet this is not merely a question of science, of the study of the physical geography of the sea, interesting as this branch of our subject has become. Upon the accuracy and completeness of charts hangs the safety of thousands of lives, and the prosperity of commerce in all parts of the world. When it is remembered how much depends upon the work of marine surveys, it must be a subject of astonishment that so many hundreds of miles of coast-line frequented by our shipping remain unsurveyed; and that even, in some cases, when the surveys have been executed and charts published by foreign governments, they are not accessible in an English form. In the interests of humanity and of the well-being of our trade, the efforts of geographers in urging the completion of marine surveys ought to be cordially seconded by Chambers of Commerce, and by all those whose material interests are concerned in the provision of accurate charts of all coasts visited by our shipping.

Hitherto I have invited your attention to the basis of geography, to the measurement of the surface of land and sea, and of their heights and depths; to the mapping of the world, and to the innumerable uses of maps and charts. But this only forms the skeleton of our science, which is endued with flesh and blood, with life and motion, by those who study the causes and nature of the changes that have taken place and are now taking place upon the earth; by comparative and physical geographers, by those who study and classify natural phenomena, and demonstrate their connection with each other and their places in the great scheme of nature.

Geography and geology are, from one point of view, sister sciences. The former treats of the earth as it now is and of changes which have occurred within historical times. The latter deals with the condition of the earth and the changes on its surface which went on during the cycles of ages before the dawn of history. The two sciences are quite distinct, while they aid each other. No geological survey can be undertaken without the previous completion of geographical maps, and the geologist is enabled to comprehend the condition of the earth in remote ages by studying the phenomena of physical geography. On the other hand, the geographer acquires a correct understanding of the present state of the earth's surface by considering the records of those marvellous changes which can be gathered from history, and from the narratives of travellers and observers in all ages. Without their services, geography would lose half its interest.

Comparative geography (the study of the changes which have taken place on the earth's surface within historical times) is, therefore, a most important branch of our science; and it enlists the historian and the topographer in our service. It is a branch of geography which has not hitherto received the amount of attention it deserves.

The importance of the study of history and of early narratives for the elucidation of points in physical geography will appear from the consideration of a few instances. Take for example the great and fertile basin of the River Ganges in India. The Sanscrit historian finds reason for the belief that in 3000 B.C. the only habitable part of the alluvial plain of India was the water-parting or ridge between the Sutlej and the Jumna. The rest was a great estuary or arm of the sea. It has only been fit for man's occupation within the historical period, and hundreds of square miles of the delta have become habitable since the days of Lord Clive. The wonderful history of these changes can be traced by the student, who thus enables the geographer to explain the phenomena which he observes. Mr. Blanford, in his charming work on physical geography for the use of Indian schools, supposes a native of the country to be standing on the bank of the river that flows by his village, watching the turbid flood swirling past. The *chur* opposite, which the river left dry when its waters fell at the close of the last rainy season, and which, till lately, was covered by a rich green crop of indigo, is now more than half cut away, and buried beneath the water. Masses, many times larger than the house he lives in, from time to time detach themselves, and are swallowed up by the deep, muddy stream. If the Hindu ponders over what he sees, he will perhaps be led to make inquiries, and old people will probably tell him that half a century ago the river itself was a moderate-sized *khal*, and that the old channel, seven or eight miles off, now little more than a string of pools, was at that time a great river. These facts and their causes will open to him an interesting chapter in physical geography; which is made more complete and more interesting by the ancient records of his people. But geography is an applied science. This body of facts and their causes is not a subject for mere speculative study only. It is of practical utility; for the knowledge of the way in which Nature has worked in past ages discloses her present and future operations, and enables the enlightened administrator and engineer to work in harmony with them.

Again, to pass to another part of the world. The student of history reads of the great sea-fight which King Edward III. fought with the French off Sluys; how, in those days, the merchant vessels came up to the walls of that flourishing seaport by every tide; and how a century later a Portuguese fleet conveyed Isabella from Lisbon, and an English fleet brought Margaret of York from the Thames, to marry successive Dukes of Burgundy at the port of Sluys. In our own time if a modern traveller drives 12 miles out of Bruges across the Dutch frontier he will find a small agricultural town surrounded by cornfields and meadows, and clumps of trees, whence the sea is not in sight from the top of the town-hall steeple. This is Sluys. A physical geographer will seek out the causes which have brought about this surprising change. They are most interesting, and most conducive to an intelligent comprehension of his science, and he will find them recorded in history. Thus the historian and the geographer work hand in hand, each aiding and furthering the researches of the other.

Once more. We turn to the great Baie du Mont Saint Michel, between Normandy and Brittany. In Roman authors we read of the vast forest called "Setiacum nemus," in the centre of which an isolated rock arose, surmounted by a temple of Jupiter, once a college of Druidesses. Now the same rock, with its glorious pile dedicated to St. Michael, is surrounded by the sea at high tides. The story of this transformation is even more striking than that of Sluys; and its adequate narration justly earned for M. Manet the gold medal of the French Geographical Society in 1828.

Once again, let us turn for a moment to the Mediterranean shores of Spain, and the mountains of Murcia. Those rocky heights, whose peaks stand out against the

deep blue sky, hardly support a blade of vegetation. The algarobas and olives at their bases are artificially supplied with soil. It is scarcely credible that these are the same mountains which, according to the forest book of King Alfonso el Sabio, were once clothed to their summits with pines and other forest trees; while soft clouds and mist hung over a rounded shaggy outline of wood, where now the naked rocks make a hard line against the harnished sky. But Arab and Spanish chroniclers alike record the facts, and geographical science explains the cause.

There is scarcely a district in the whole range of the civilised world where some equally interesting geographical story has not been recorded, and where the same valuable lessons may not be taught. This is comparative geography.

The peasant of Bengal sees the mould falling into his turbid river, and learns the first lesson of a course which teaches him the history of the formation of the mighty basin of the Ganges. So should we, in England, to use the words of Professor Huxley, "seek the meanings of the phenomena offered by the brook which runs through our village, or of the gravel pit whence our roads are mended." Their meaning is equally significant, equally instructive, and it is thus that we should all begin to learn geography.

Here, in this valley of the Don, as elsewhere throughout England and the wide world, the lessons of geography are open for you to learn. I intend, with the permission of the Section, to conclude this address by referring to the physical geography of the basin of the River Don, not presuming to teach the natives those natural features which they must needs know far better than I, but endeavouring to point out how each feature has its lesson to teach, which bears on questions relating to distant lands, and how a man may become a sound practical geographer without going more than twenty miles from his own door. In this way I would urge all my countrymen whose destiny is not to travel far afield, by studying the geography of their own native district, to acquire a comprehensive grounding which will fit them to discuss more general geographical questions relating to broader problems and more distant regions.

Your own poet had all the instincts of a true geographer: he who sang of your—

"Five rivers, like the fingers of a hand,
Flung from black mountains, mingle, and are one
Where sweetest valleys quit the wild and grand
And eldest forests o'er the sylvan Don,
Bid their immortal brother journey on,
A stately pilgrim, watched by all the hills."

In the region watered by that river there are doubtless many others whose unspoken thoughts often echo the words of the Sheffield poet, and to whom I would fain speak of the valley of the Don and its geographical features.

Afterwards the Section will be occupied with several important papers teaching us lessons, and telling us most valuable stories relating to other and more distant parts of the world. In the few remarks I have now addressed to the Section, I have endeavoured to introduce the subjects of those papers, by touching upon the position of geography as a science, and on the numerous practical uses to which our various results can be applied. These uses will appear in their concrete form in the papers which will occupy us during the present and ensuing meetings.

[A summary of the papers and discussions will appear in our October number.]

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—July 4th: M. DAUBRÉE in the Chair.—It was announced by a telegram from the President of the Italian Geographical Society at Rome, that a meeting had been held that day for the purpose of hearing from M. de Brazza an address on the subject of his expedition to the sources of the Ogowé. The French Ambassador was charged to deliver to the explorer the great Medal of the Society.—Letters were then read from the French Consul at Zanzibar communicating recent news relative to the various exploring expeditions; and from the French Minister at Lisbon, announcing the delivery of an address by Major Serpa Pinto before the king on the 16th of June, followed on subsequent days by three other addresses to the Geographical Society of Lisbon.—M. de Lesseps announced the return to Paris of Commander Roudaire, from his investigation of the Algerian and Tunisian chotts. He stated that Commander Roudaire was still convinced of the possibility, and even of the necessity, of extending the Gulf of Gabes into the interior of Algeria. The chotts were drying up, and the oases of the neighbouring regions would be soon deprived of water, and become part of the desert. This theory of the supply of water to the wells of the oases is considered a novel one, and to require explanation by the results of M. Roudaire's surveys, not yet published, before it can be properly appreciated.—M. de Lesseps also announced to the Society that he had assumed the entire financial responsibility of the future ship canal of Panamá. It had been arranged that the whole direction of the enterprise should be placed in his hands. He compared the difficulties of constructing the canal to those which he had encountered in that of Suez, and showed them to be the same. The engineers had already studied the modifications which had been required in the Wyse-Réclus project, i. e. the diversion of the waters of the Chagres and the substitution of an open cutting in the place of a tunnel, and a solution on these heads had been arrived at.—Admiral de la Roncière le Noury informed the Meeting that the Minister for Foreign Affairs had accorded, at the request of the Society, the Cross of Commander and Officer of the Legion of Honour to the principal members of the Canal Congress.—A paper was read on his explorations in Sonora, by M. Pinart, who had been charged with a scientific mission in that region. The paper contained little of Geographical interest.

July 18th: M. DAUBRÉE in the Chair.—A paper was read by M. de Mosenthal "On Southern Africa and the Zulus," illustrated by a collection of weapons and utensils. The author had passed the greater part of his life in the Orange River Republic, and had travelled in all the neighbouring region.—M. de Lesseps announced that the subscription for 800,000 shares at 500 francs each, of the Panamá Inter-oceanic Canal Company, would be opened on the 6th of August. He expressed himself astonished and even disappointed that the project was advancing so smoothly—a little serious opposition would have been agreeable to him. As to the criticisms of various newspapers in the United States, they were of no avail against the public opinion of the country, and the opponents themselves had begun to perceive that all interference by any constituted authority had been effectively provided against, either by the Congress or by himself. There was no fear of diplomatic or political intervention, and the arguments put forth against the enterprise had therefore no foundation. He enumerated the towns of France which had solicited his presence to explain the scheme, and which he had arranged to visit.—Notwithstanding his advanced age, M. de Lesseps is making as active a propagandism for the Canal of Panamá as he formerly did for that of Suez.—A paper was read on "the New Hebrides Archipelago," by M. l'Abbé Durand. He stated that eight thousand of the

natives of these islands had been converted to Christianity.—A memoir was read from M. l'Abbé Ménager, on his meteorological observations made at Whydah, on the west coast of Africa. They referred particularly to the season of the Harmattan or dry wind from the Sahara, a phenomenon peculiar to the east of Guinea, and one which deserves the careful attention of physical geographers.

Special Meeting at the Sorbonne: July 21st.—An address was delivered by Major Serpa Pinto on his recent journey across Africa. Only a general sketch of his journey was given by the traveller, the scientific details being promised for the first ordinary meeting of the Society.

Geographical Society of the Netherlands.—June 14th: M. W. F. VERSTEEGH, Vice-President, in the Chair.—A paper was read on "The Exploration of the Kara Sea," by Professor C. M. Kan, D.L. The author discussed the subject in connection with the Dutch Arctic Expeditions. Commencing with an historical review, he said that all the attempts of English, Dutch, Danes, and Russians to penetrate the Kara Sea between the years 1555 and 1864 had failed, with some few partial exceptions, when a few miles had been explored, or when the Russians had voyaged along the coast, suffering shipwrecks and disasters. The Russian professor Von Baer, had in 1869 compared the Kara Sea to an "Ice Cave," though in the same year, and later on, in 1870 and 1871, several fishing vessels had cruised about it in all directions. In 1872, however, these vessels met with less success. The re-opening of the Kara Sea was due to Professor Nordenskiöld, who not only traversed the "Ice Cave" successfully in 1875, 1876, and 1878, but penetrated eastwardly to the mouths of the Ob and the Yenisei, and showed the way to numerous trading vessels which thereupon made the voyage out and home from European ports to the Siberian commercial stations. Professor Kan estimated that the number of these successful voyages of recent years almost balanced the number of unsuccessful attempts of the last three centuries, and that the impracticability of this Arctic trade-route was as far from being proved as its continuous utility. In fact, the seasons suitable for navigating the Kara Sea could not be determined by reference to those in which former explorations were made, for voyages undertaken in different ships and in different months had in some years failed, and in others succeeded. Further explorations are therefore necessary before a judgment can be formed, and such explorations might be made to yield great results both to science and to trade. Such scientific results as had hitherto been gained had been made either by insufficiently qualified persons, or by Nordenskiöld in his hurried voyages. A thorough investigation of the condition and position of the ice as ruled by winds and currents, especially by the spring winds, is still required. Professor Kan therefore advocated the institution of careful methodical observations, including the examination of the mouths of the Ob and Yenisei, as better calculated to attain the desired result than general voyages of exploration. In such an investigation the interests of commerce should be made prominent. It is true that in 1876 upwards of ten ships with general cargoes sailed from Hull, Hamburg, Bremen, and the Norwegian ports for the Siberian rivers, and that vessels built on those rivers had made the voyage to Europe, and that (as the author had learnt from Dr. Lindemann of Gotha), four ships were preparing to sail this summer; but this was after all only a partial trade, and many difficulties had to be contended with, such as want of good harbours, warehouses, and the backwardness of Russian merchants. Much information had been gleaned by the Bremen Scientific Expedition of Messrs. Finsch, Brehm, and Zeil to the lower Ob, and by the private enterprise of Mr. Henry Seeböhm; and Professor Kan stated that the instructions to the Dutch Arctic Expedition of the present summer in the *Willem Barents* admitted of its entering on this field of

exploration. After the conclusion of this paper, a formal reception was given to the following members of the Sumatra Expedition, on their return to Holland:—MM. Van Hasselt, D. D. Veth, Snelleman, and Makkink. The President in a brief address gave them a hearty welcome on behalf of the Society, and alluded in commendatory terms to the absent members, M. Schouw Santvoort, who died in Sumatra, and M. Cornelissen, his successor, who was now in Netherlands India, on other duties. The work performed by the Expedition had led to a great increase of our knowledge of those parts of Sumatra not in Dutch territory. He announced that M. D. D. Veth would shortly publish a work giving the results of the Expedition, especially as to ethnology.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

AFRICA.

Matteucci, Pellegrino.—Spedizione Gessi-Matteucci. Sudan e Gallas. Milano (Treves): 1879, 12mo., pp. 303, map. (*Dulau.*)

An account of the expedition undertaken by Matteucci and Romolo Gessi, under the auspices of the Italian Geographical Society, in 1877-78, with the intention of reaching Kaffa by following the Blue Nile instead of penetrating from Shoa. Starting on October 1, 1877, Khartum was reached on January 24, Famaka on February 15, and Fadasi (90 N. lat.) on March 15, 1878. Further progress being impossible, the party returned to Khartum, arriving in Italy on July 18th. The map (scale 1 : 1,000,000) shows the route from Khartum to Fadasi, the affluents of the left bank of the Tumat branch of the Blue Nile being well given on it.

Nachtigal, Gustav.—Saharâ und Sûdân, Ergebnisse sechsjähriger Reisen in Afrika. Erster Theil. Berlin (Reimer; Parey): 1879, large 8vo., pp. 748, maps, tables, illustrations. (*Dulau.*)

The first volume of this long-expected work has appeared in German, though it can only be a question of time with regard to the translation into English of a book of such value and interest to British geographers. It is divided into three sections, discussing respectively (1) Tripoli and Fezzân, (2) Tibesti or Tu, and (3) the author's journey to Bornû. Dr. Nachtigal first went to North Africa at the end of 1862, and after a stay in Constantine and Tunis, arrived at Tripoli in 1868, intending to start thence for the interior. The first chapter contains many ethnological, economic, and statistic particulars concerning Tripoli, and concludes with an account of the author's preparations and his departure on the journey to Fezzân, which is discussed in Chapter 2. His route was in a south-easterly direction, almost parallel with the Mediterranean coast to Bû-N'dschem in Urfilla, whence he struck southwards and south-east to Mursuk, to the description of which and its inhabitants Chapter 3 is devoted, a plan of the city (scale 1 : 12,500) being given. Chapters 4, 5, and 6 contain descriptions of the physical geography and topography of Fezzân, of its climate and prevalent diseases (of which the author's medical training enables him to make a critical report), and of the history and population of this, the ancient Phazania or Land of the Garamantes.

The second book discusses the southern part of Fezzân, which Dr. Nachtigal traversed in a south-easterly direction from Mursuk to Quatrûn, thence striking south-westerly by Tedscherri and the Alaôta Kju plateau to the mountains of Tûmmo or El-Wâr. Here, turning again to the south-east, an unknown region was entered, the Afâfi mountains being crossed, and Tâo (20° N. lat.) reached, via Afo. From Tâo, a short excursion was made up the valley of the Zuâr, on

the south of the Tibesti range, of which the river systems are accurately described, and then the author struck from Tāo in a north-easterly direction across the volcanic mountains of Tarso to Bardai, from which, after a stay of nearly a month, he was obliged to fly in September, 1869, returning to Tūmmo in South Fezzān over the Arfāfi Range by a route parallel to his former one, and finally arriving again at Mursuk. The physical geography, products, flora, fauna, and meteorology of all this is treated with a special chapter on the ethnology and political and social economy of the Teda.

Book 3, which brings the narrative down to the end of 1860, describes the incidents of wintering in Mursuk (with an account of Miss Tinné's murder), and of the author's southward journey to Kawār, or the Tūgé Valley (containing several oases cultivated by the Teda), and thence across sandhills and steppes to the north end of Lake Tchad, where ostriches, antelopes, lions, and giraffes were met with. The remainder of the volume is occupied with the description of Kūka, the chief city of Bornū, on the west side of the Lake. Here Dr. Naeltigal's stay from the beginning of July 1870 to the middle of March 1871, enabled him to get together a great quantity of minute information thoroughly elucidating the physical conditions of the country and the history, customs, &c., of its people.

Independently of the interest attaching to the personal narrative of adventure in this volume, and the dangers and privations undergone by its author, it must remain the standard authority upon the regions discussed in it, from the wide range and precise nature of the information which it contains (as a random instance of the latter, the account on p. 661, of the native nomenclature and discrimination of species of the *Locustidae* of the Tchad district, may be quoted).

Minute attention is given throughout to such varied subjects as the occurrence of natural springs, the distribution and economic uses of plants, climatic phenomena, markets, dialects, art-products, history, &c., in addition to topography and the description of the physical features of deserts, mountains, valleys and rivers which no former traveller has visited.

Tables are given of thermometric and barometric observations taken at different (named) places on the various journeys above referred to, with notes as to wind, rain, &c. These are dated throughout.

The maps (in colours, and of superior execution) are (1), of the region traversed from Tripoli to the southern boundary of Fezzān; (2) of the Tibesti and Tchad journeys (containing also the author's route to Borkū not described in this volume). Both are on the scale of 1:2,000,000, and exhibit oases, deserts, and other sandy places, valleys, &c., by special colours or signs, in addition to various inscriptions elucidating physical conditions and the usual hill, river, and road work.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Bufalini, Leonardo.—La Piauta di Roma di Leonardo Bufalini. Da un esemplare a penna già conservato in Cuneo riprodotto per cura del Ministero della Pubblica Istruzione. Roma: cromolitografia Bruno E. Salomone, 1879. (*Dufau.*)

This is a reproduction of a map found by the author in the Convent of the "Madonna degli Angioli in Cuneo," when it became the property of the Italian Government. It is probably the original from which the edition published by *Magistrum Leonardum Die XXVI. Mense Maij. Anno Domini MDLI.* was copied. It differs in some respects from the Barberini example, and bears the date MDII. in two places; this, however, may be an error, as it is marked

May the 26th, that being the day marked on all the other examples of this map in conjunction with the date 1561, which is in all probability the date of this map, of which the other examples are but copies. This reproduction is a facsimile on 12 sheets.

Erdmann, Prof. A.—Sveriges Geologiska Undersökning. Scale 1:50,000, or 1·4 inches to a geographical mile. Under the direction of Prof. A. Erdmann. Stockholm, 1879. Sheets Nos. 63, 64, 65 and 66, 67. (*Dulau.*)

Favre, Alphonse.—Carte Géologique du Canton de Genève par Alphonse Favre, Professeur à l'Académie de Genève. Scale 1:25,000, or 2·9 inches to a geographical mile. Publiée sous les auspices de la Classe d'Agriculture de la Société des Arts. Wurster, Randegger, & Co., Winterthur, 1879. (*Dulau.*)

Goudey, A.—Lyon et ses environs. Plan topographique. Scale 1:20,000, or 3·6 inches to a geographical mile. Par A. Goudey. S. Pelletier, Lyon, 1879. (*Dulau.*)

Logerot, J. Gaultier, Senr.—Plan de Paris Actuel. Logerot, J. Gaultier Senr. Paris, 1879. (*Dulau.*)

Maschek, R., Senr.—Umgebung von Zirl, Landeck und Nauders; Nördlicher Theil der Oetzthaler Ferner in Tirol. Scale 1:129,600, or 1·7 geographical mile to an inch. Artaria & Co., Vienna, 1879. (*Dulau.*)

This is one of the series of Tourists' Maps of the Tyrol, published by Artaria & Co., Vienna. It contains a great amount of information, is clear, well drawn, and is well adapted to the purpose for which it is published.

ORDNANCE SURVEY MAPS.

6-inch—County Maps:—

ENGLAND AND WALES: Flint 12 and Denbigh 14, on one; Flint 22 and Denbigh 36, on one; Denbigh 35 and Flint 21, on one. Sussex, Nos. 4, 10, 21, 72, 77.

SCOTLAND: Argyll (Isle of Rum), No. 61.

25-inch—Parish Maps:—

ENGLAND AND WALES:—Berks: Ashampstead, 8 sheets; Basildon, 9 sheets; Bradfield, 13 sheets; Buckland, 3 additional sheets; Denchworth, 7 sheets; Drayton, 2 additional sheets; Great Farington, 3 additional sheets; Longworth, 3 additional sheets; Pangbourne, 6 sheets; Paisey, 2 additional sheets; Purley and ditto (detached, Nos. 1 and 2), and Saltney Mead, 5 sheets; Saint Nicholas, 1 additional sheet; Stanford in the Vale, 11 sheets; Tilehurst, 12 sheets; Waldrist, 1 additional sheet; Whitechurch and ditto (detached, Nos. 1 to 6) and Saltney Mead, 4 sheets. Bucks: Amersham, 4 additional sheets; Chenies, 1 additional sheet; Weston Turville, 9 sheets. Cheshire: Runcorn, 10 additional sheets. Derby: Heath, 2 additional sheets. Essex: Barking, 6 additional sheets; Braintree, 1 additional sheet; Great Canfield, 1 additional sheet; Great Coggeshall, 1 additional sheet; Great Saling, 1 additional sheet; Panfield, 2 additional sheets; Hasted, 4 additional sheets. Glamorgan: Coity, 4 additional sheets; Coychurch, 5 additional sheets; Glamstrissant, 3 additional sheets; Newcastle, 1 additional sheet; Pendoylan, 9 sheets; Peterston, Super Ely, 8 sheets; St. Bride's Super Ely and ditto (detached), 8 sheets; St. George's, 3 sheets; St. Lythan's, 5 sheets; St. Nicholas, 8 sheets. Herts: Studham, 8 sheets; Westmill and Standon (detached), 8 sheets. Oxford: Bampton, 2 additional sheets; Bix, 11 sheets; Culham, 2 additional sheets; Meiton, 1 additional sheet. Surrey: St. Giles, Camberwell, 14 sheets; St. Mary Newington, 5 sheets. Wilts: Eisey, 1 additional sheet.

Town Plans:—

London, 25 inch, sheet 44; Edinburgh, 5 feet, sheets 38a, and 31 revised.

GEOLOGICAL SURVEY MAPS.

1-inch—

ENGLAND :—No. 92, S.E.

6-inch :—

Durham, No. 52 ; Northumberland, Nos. 46, 106*b* ; Westmorland, Nos. 25, 31 ; Yorkshire, No. 98. (*Stanford, agent.*)

ASIA.

E. C. L.—Carte des Missions de l'Indo-Chine, par E. C. L., ancien missionnaire. Scale, 1 : 5,000,000 or 66·6 geographical miles to an inch. Challamel Ainé, Paris, 1879. (*Dulaeu.*)

The author of this map (who only gives his initials, and styles himself "ancien missionnaire") lays down very clearly the boundaries of Birmah, Tong-King, Cochin-China, and the Malay Peninsula. The map is coloured in such a way as to show the progress of mission work amongst the natives, those portions of the different states, in which Christians are to be found, being marked by a darker shade of the colour by which the state itself is distinguished.

Russian Military Topographical Department.—Map of the Theatre of War in Afghanistan, 1878–79. Scale 1 : 1,100,000 or 15 geographical miles to an inch. Russian Military Topographical Department, 1879. (*Dulaeu.*)

This map does not include the recent Russian Topographical Survey by Colonel Grodekof from Patta-Kissar on the Oxus (by way of Mazar-i-Sharif, Saripul, Maimenah, and the Hazret-i-Baba Pass) to Herat; indeed its limits, which extend from Lat. 29° 38' N. to Lat. 35° 5' N., and from Long. 65° to 72° 44' east of Greenwich, do not include that portion of the country. This is the more to be regretted, as a great part of the country traversed by Colonel Grodekof is but little known to geographers. The map as it at present stands contains nothing which may not be found in the maps published by the Government of India, and H. Kiepert's two maps, "Iran (Afghanistan, Balutschestan)" and "Die Landschaft zwischen Kabul und dem Indus," while at the same time it contains some topography which, being to a great extent conjectural, has been expunged from the most recent maps, its place being filled up with the results of route surveys. A case in point is the topography of Sewestan, which in this map is evidently copied from the map of Baluchistan published at Calcutta in 1876 by the Surveyor-General of India. The Anabar River is not shown at all, but a route is given which must of necessity have crossed it, and it would seem from the recent Route Survey of Captain Holdich, R.E., that Major Wilson's map is in this respect much more accurate than the Russian map, on which the respective positions of Thal and Chotiali with reference to one another are very different from those assigned to them by Captain Holdich, who found Chotiali to be nearly east of Thal, and situated on the Chemalang River, an affluent of the Anumbar, which latter is indeed the main River, and into it the Gorzannuni, on which Thal is situated, also flows. There is little to recommend this map to the attention of the English student; it is far from being a good specimen of cartography; it contains no new geographical information, and the lettering being in Russian character, is not intelligible to the general public.

Indian Government Surveys.—Map of the Neilgherry District, compiled from former Surveys. Roads and Boundaries of Nads are shown as they existed in 1871. Scale 1 mile to 1 inch. On 2 sheets. Size 52 inches by 40.—Map of the Ellore Taluq, Godavery District. Reduced from the Maps of the Revenue Survey, executed in 1862 and 1863, by Major W. Crewe, 32nd Madras Native Infantry, Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. On 2 sheets. Size 52 inches by 40.—Map of the Peddapur Taluq, Godavery District. Reduced from the Maps of the Revenue Survey, surveyed in 1862 by Major W. Crewe,

32nd Madras Native Infantry, Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. On 2 sheets. Size 52 inches by 40.—Map of the Palnad Taluk, Kistna. Reduced from the Maps of the Revenue Survey, completed in 1869 by Lieutenant-Colonel W. Crewe, Staff Corps, Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. On 4 sheets. Size 46 inches by 60.—Map of the Vinukonda Taluk, Kistna District. Reduced from the Maps of the Revenue Survey, executed in 1864 and 1865, by Lieutenant-Colonel W. Crewe, Staff Corps, Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. On 2 sheets. Size 40 inches by 52.—Map of the Kulittalei Taluk, Trichinopoly District. Reduced from the Maps of the Revenue Survey, executed in 1861 and 1862, by W. Beaumont, Esq., Acting Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. On 4 sheets. Size 56 inches by 50.—Map of the Kadavur Zemindari, Kulittalai Taluk, Trichinopoly District. Reduced from the Maps of the Revenue Survey, completed in 1874, by H. Gompertz, Esq., Acting Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. Size 40 inches by 27.—Map of the Marungapuri Zemindari, Kulitali Taluk, Trichinopoly District. Reduced from the Maps of the Revenue Survey, completed in 1874, by H. Gompertz, Esq., Acting Deputy-Superintendent Revenue Survey. Scale 1 mile to 1 inch. Size 40 inches by 27. (*Stanford, agent.*)

NEW ZEALAND.

Connell and Mudie.—Plan of Southland Estates, Waimea Plains, Croydon, Wantwood, Okaterua, Longridge Dome, Eyre Creek, and Ardlussa, comprising 309,000 acres, the property of the New Zealand Agricultural Company, Limited. Scale 1 : 95,000 or 1·3 geographical mile to an inch. Also Key Map to the Province of Otago. Scale 1 : 750,000 or 10·3 geographical miles to an inch. Compiled by Messrs. Connell and Mudie, Surveyors, Dunedin, N.Z. Waterlow & Sons, London, 1879.

POLYNESIA.

Whitmee, Rev. S. J., F.R.G.S., C.M.Z.S.—Ethnological map of the Pacific Islands. Scale 1 : 20,000,000 or 266·5 geographical miles to an inch, by Rev. S. J. Whitmee, F.R.G.S., C.M.Z.S. E. Stanford, London, 1879. (*Stanford.*)

This map shows the distribution of races of men in the intertropical islands of the Pacific, and agrees in its main features with the ethnographical charts of the Pacific already published, but gives more detail. It has been constructed in a great measure from the author's personal knowledge, supplemented by information obtained from persons who have lived on, or travelled amongst the islands in various parts of the Pacific. The map is accompanied by sixteen pages of letterpress in which the author sets forth his views with reference to the ethnology of Polynesia.

ATLASES.

Dalp, J.—Topographischer Atlas der Schweiz. Scales 1 : 25,000 or 2·9 inches to a geographical mile, and 1 : 50,000 or 1·4 inch to a geographical mile. XIII. Lieferung, Bl. 114, Biaufond; 116, La Ferrière; 128, Bätterkinden; 134, Neuveville; 136, Erlach; 143, Winigen; 144, Hindelbank; 312, Sugiez; 313, Kerzers; 332, Neueneegg; 334, Schwarzenburg; 352, Wattenwil. XV. Lieferung, Bl. 263, Glarus; 367, Wimmis; 425, Scarl; 427, Bevers; 429, St. Maria; 429 bis, Stilsérjoch; 523, Castasegna; 525, Finhaut; 525 bis, Col de Balme; 526, Martigny; 529, Orsières; 532, Grand St. Bernard. J. Dalp, Bern. 1879. (*Dulau.*)

EDUCATIONAL.

Haardt, V. v.—Geograph. Atlas für Volksschulen. 12 Maps. Hölzel, Vienna, 1879. (*Dulau.*)

Stanford, E.—Stanford's Atlas for Indian Schools. 24 coloured maps. E. Stanford, London, 1879. (*Stanford.*)

Ward, M.—Universal Atlas for School and Home. M. Ward, London, 1879. (*Ward.*)

CHARTS.

Admiralty.—Charts published by the Hydrographic Department, in May and June, 1879.

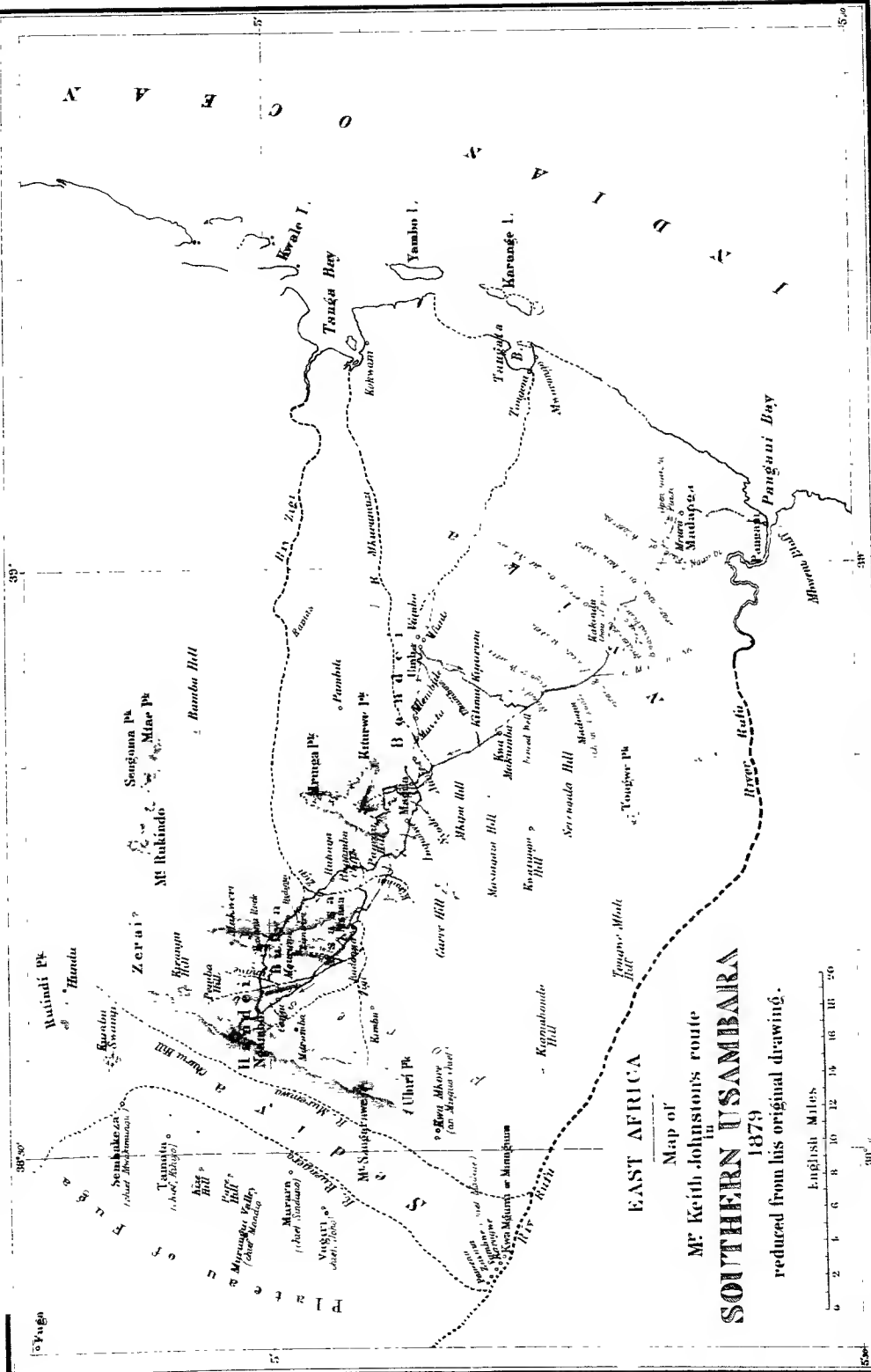
No.	Size.	Inches.	
1587	$\frac{DE}{4}$ m	= 0.9	Adriatic:—Valona Bay.
410	$\frac{DE}{2}$ m	= 0.86	Cuba:—Cárdenas and Sta. Clara bays, and port Cabanas.
1561	$\frac{DE}{2}$ m	= various.	{ Adriatic:—Ports Lussin Piccolo, Cherso, Veglia, Segna or Zengo, Arbe, Krcul, Berguglie, Lungo, Manzo, and S. Pietro Di Nembo.
2323	DE m	= 0.05	North America, west coast:—Manzanilla bay to the gulf of California, including the Revilla Gigedo islands.
2324	DE m	= 0.05	North America, west coast:—Cape San Lucas to San Diego bay, with the gulf of California.
1581	$\frac{DE}{4}$ m	= 2.4	{ Adriatic:—Approaches to port Sebenico, with Morter bay.
718	$\frac{DE}{2}$ { m = 1.0 m = 4.0		{ Islands off north coast of Madagascar:—Aldabra, Assump- tion, Cosmoledo group, Farquar group, with entrance to Inner harbour.
233	DE m	= 0.45	Egypt:—Suez canal.

No. 2887. An enlarged Plan of Mare island, strait added. No. 2416. Plan of Kerama channel and anchorages added. No. 2259. Plan of Ceniza mouth of the Rio Magdalena added. No. 1908. Plan of San Juan anchorage cancelled, and plan of Asuncion passage added. No. 587. Slip, and plan of Maldonado and adjacent shoals added. No. 1876. Plans of Chamatla river, ports Sihuatanejo and San Blas, transferred to this sheet from No. 588.

CHARTS CANCELLED.

No.		Cancelled by	No.
1587	Avlona	New plan. Valona bay ..	1587
410	Mono, Piedras, Monillo cays, &c.	New plan. Cárdenas and Sta. Clara bays, and Cabanas ..	410
1681	Palmyra point to Chittagong.		
1561	Port Lussin Piccolo	New plan. Ports and an- chorages in the gulf of	
1569	Canale di Sette Boche, &c. ..	Quarnero	1561
1677	Kerso or Cherso, Porto Re, &c.		
2323	Manzanilla bay to the gulf of California	New chart. Manzanilla bay to the gulf of California ..	2324
2324	Cape San Lucas to San Diego bay	New chart. Cape San Lucas to San Diego bay	2324
1567	Morter Canale	New plan. Approaches to port Sebenico, with Morter	
1581	Sebenico, port	bay	1581
718	João de Nova islands	New plan. Islands off north coast of Madagascar ..	718
588	Dulce river to gulf of Cali- fornia	Coiba island to Mangrove bluff	587
233	Suez canal	New plan. Suez canal ..	233

Dépôt des Cartes et Plans de la Marine.—No. 3680. Carte pour la navigation par l'Arc de Grand Cercle, 1^{ère} Feuille: Océan Atlantique, 1879.—3681. Carte pour la navigation par l'Arc de Grand Cercle, 2^{me} Feuille: Mer des Indes, 1879.—3682. Carte pour la navigation par l'Arc de Grand Cercle, 3^e Feuille: Océan Pacifique, 1879.—3624. Mer Baltique. Archipels d'Aland et d'Abo, 1878.—3697. Côte occidentale de France. Le Coureau d'Oleron, 1879.—3600. Carte des côtes de France. Embouchure de la Gironde et partie de la Garonne et de la Dordogne, 1878.—3670. Côtes septentrionales de France: Plan du port et de l'anse de Paimpol, 1878.—3639. Côte nord d'Espagne: Port du Passage, 1878.—3647. Plan de la baie de Saint Jean de Luz, 1878.—3654. Mer Noire: Danube, bouches de la branche Kilia, 1878.—3657. Mer Méditerranée: Côte S.E. d'Espagne, Plan de l'anse de Benidorme, 1879.—3652. Baie de Taormina (Sicile, côte est), 1878.—3660. Mer Adriatique: Port de Klek; Port Palma, Bouches de la Narenta; Port tre Pozzi.—3667. Mer Adriatique: Port de Sebenico et ses approches, 1878.—3683. Mer Adriatique: Canal de Sabioncello, Canal de Spalato, Port Rosso (Ile Lagosta), Port de Valle Grande, Stagno Piccolo, 1879.—3685. Mer Adriatique: Port S. Giorgio di Lissa, Port Berna, Port Carboni, Port de Palazzo (Ile Meleda), 1879.—3599. Mer Adriatique: Côte d'Istrie, Pola, 1877.—3596. Mer Adriatique: Port d'Umago, Baie de Pirano, Port de Daila, Port de Parenzo, 1877.—3535. Mer Adriatique: Buccari, Porto Re, Veglia, Zengg Arbe, Golfe de Medolino, 1877.—3698. Mer des Indes: Croquis du Mouillage de Moroni, Côte ouest de la Grande Comore, 1879.—3649. Golfe du Bengale: Golfe de Martaban entre les Moscos du nord et le Cap Négrais, 1878.—3659. Golfe du Bengale: Baie de Coringa ou Cocanada et Bouches du Godavery, 1878.—3650. Golfe du Bengale: Côte de Pegu, Rivière de Rangoon, 1878.—3686. Golfe de Siam: Plan des Iles Pirates, 1879.—3630. Golfe du Tong-Kin: Plan de l'Ile Guie-chow et Mouillage de Nam-wan, 1878.—3642. Tong-Kin: Plan des Isles de Hon-Matt et Hon-Gneu et de la partie de la côte du Tong-Kin, 1878.—3549. Vues de la côte de Cochinchine, 7^e Feuille, 1878.—3656. Côte orientale de la Chine: Rivière de Wan-chu et ses approches, 1878. 3671. Côte orientale de la Chine: Mouillage de la Pointe Dwarf à l'extrémité sud-est de l'Ile Hai-tan, 1878.—3625. Japon: Croquis du Mouillage de Yebisu-Minato, 1878.—3677. Côte N.E. de Terre-Neuve (Baie Aux Lièvres), Plan du Havre How (Baie Aux Outardes ou Hodidou), 1879.—3690. Terre Neuve (Côte ouest), Havre de Pic-Denis (Baie de Port à Port), 1879.—3655. Antilles: Ile de St. Vincent, 1878.—3635. Côte est de Patagonie: Plan de l'Ile Leones, de la Baie Gill et du Bassin de l'Oven, 1878.—3672. Australie, Côte nord-est: Port Albany, 1879.—3637. Australie, Côte est, Port Bowen, 1878.—3646. Nouvelle Calédonie: Port de Pouebo, 1879.—3663. Nouvelle Calédonie, Côte ouest: Baie Muendu, 1878.—3668. Nouvelle Calédonie: Port de Mueo, 1878.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Survey Operations of the Afghanistan Expedition ; the Kurram Valley.

By Captain GERALD MARTIN, Bengal Staff Corps, Assistant-
Superintendent, Survey of India.

Map, ante p. 80.

Introduction.—In accordance with the desire expressed by the Surveyor-General of India that I should write a short narrative report of the proceedings of the survey party attached to the Kurram Valley field force, I have attempted to draw up the following account, and to keep it as concise as possible, without omitting anything I thought of great importance or likely to be of interest. I feel that Captain Woodthorpe, R.E., would probably have done this duty far better than myself, as he was with the column from the commencement of the expedition, and with it throughout the operations in Khost, while I was not; but he had other duties to attend to, and thus the reporting of our experiences fell on me. He has, however, informed me of all that happened before I joined, and by this information, combined with my own experiences since I have been with the force, I hope I have compiled a report which will answer the purpose required.

The area which has come under survey extends first from Thal up the Kurram Valley to the Paiwar range, being bounded on the north by the mountains of the Safid Koh; next the district of Khost to the south of the Kurram, including the mountains between it and that river; also the country west of the Paiwar range, called the Ariob, not Haliab, as some writers have put it, up the Hazardarakht stream to the Shutar-gardan; and again the country south of this to the land of the Ahmed Khels, Lajhwars, and Chakmannis on the Kurram; besides having sketched some other portions of the country on the south side of this river. We also were enabled to cross the Lakerai Kotal (pass) of the Safid Koh range, for a short distance, and so mapped a

small portion of the valley of the Surkab River north of these mountains.

Altogether the country surveyed amounts roughly to an area of about 4500 square miles; the most eastern point being Thal, lat. $33^{\circ} 22'$, long. $70^{\circ} 36'$; the most western the Shutar-gardan Kotal, lat. $33^{\circ} 56' 30''$, long. $69^{\circ} 24' 50''$; the most northern the Lakerai Kotal over the Safid Koh, lat. $34^{\circ} 5' 10''$, long. $69^{\circ} 50' 30''$; the most southern a point on the watershed between the country of the Waziris and Khost, lat. $33^{\circ} 12' 40''$, long. $70^{\circ} 7' 50''$. We have not had time at present to work out all our calculations, so these values are not final, but they may be taken as approximately correct, and refer to spots actually visited, though of course we were able to fix many distant points which will be of use to future explorers. The scales used were 4 miles to the inch for the geographical map, and 1 inch to the mile for the route survey.

Rivers.—The rivers in our work are nearly all so intimately connected with the Kurram, that in the description of that stream I shall give an account of most of the others that pour into the valley.

The River Kurram is fed by three streams of importance, which flow into and join in the Ariob Valley. They are:—

1. The Smaller Hazardarakht or Ghogazai stream, rising north-east of the Sirkai Kotal, flowing for about 8 miles in a north-easterly direction, and then turning south-west and flowing past the village of Ghogazai to that of Dreikula, where it meets the Hazardarakht stream proper.

2. The Hazardarakht stream rises near the Sirkai Kotal, from a high hill to the south-east of that kotal, called Saratega, and flowing almost parallel with the Ghogazai, meets the latter near Dreikula. On their junction they flow in a south-westerly direction and continue to flow so to Ali Khel, under the name of the Hazardarakht (thousand trees).

3. The third is the Ariob, which rises in the Paiwar range, and flows in a westerly direction, being fed by the Sargal from Ada Khel, the Laridar from the Lakerai Kotal, and the Karchatel from Ali Sangi, and other minor streams, until it meets the Hazardarakht stream at Ali Khel.

The real source of the Kurram River should be considered the second of these, viz. the Hazardarakht, as it is the longest and has the largest body of water. These three streams thus joined flow on under the name of the Ariob—but of course it is really the Kurram River—in a westerly direction (it is fed by small streams, the most important of which is the Dapozai, running down from Saratega, and passing the village of Dapozai, which is on the right bank of the Kurram), for about 12 miles, when it suddenly turns sharply to the south, between very close precipitous rocky sides, a most peculiar formation, the stream not

being broader than about 50 feet. This place is called the Tangi, and is just opposite the villages and in the territory of the Ahmed Khels. Near here the Ariob, or Kurram, as it really is, is fed by a stream which rises near the Surki or Spiga Kotal (not Surkai) on the road to Ghazni, but probably rising *really* in the mountain Saratega, over the Surkai Kotal. This stream is also called the Ghunzai.

From the point where the Ghunzai or Surki meets the Kurram the latter flows a little south, and is met by the Wom on the left bank, and the Ooma on the right, all near Ahmed Khel. From Ahmed Khel the river bends again and flows in an easterly direction past Lajhi, Keraia, &c., to Kurram. It is fed in this part (where it bears the name of Kurram) by many streams; the principal being, the Wom, Mangior, Isteah, Spingawai, and Shaluzan streams on its left bank; and the Ooma, Lajhi, Gabara, Zigor, and Darwazagai on its right bank.

A little below Kurram Fort the Karman River from the Safid Koh flows into the Kurram, and about this point the river takes a more south-easterly direction until the Karmana River from the Mozazai Valley flows into it, when it turns almost due south to Hazar Pir. Here the Jaji Maidan River joins the Kurram on its right bank, and the latter then again flows south-east to Thal; thence to Bannu, and into the Indus at Isakher. From the Shutar-gardan we were able to see the Logar or Logard River in the distance, but I was not able to get near enough to fix or draw it in; in fact, as I explain further on, my visit to the Shutar-gardan was so hurried I could do but little. The name of this stream is written by the Ghilzais as Logar, لوگار, but by the Farsibands or Persian-speaking inhabitants, i. e. the tillers of the land generally, it is written Logard (soft d), لوگرد.

Of the other streams, the Laridar, mentioned above, is important, as it rises by the Lakerai Kotal of the Safid Koh, which is a pass towards Jagdalak and Gandamak, and to get to the pass one has to go up the bed of the Laridar stream. I was able to put in the Surkab River at its source, which flows down from the north side of the Lakerai to the district of Esarak and round easterly to Gandamak.

I notice that Colonel Edwardes, in his account of the Kurram Valley in 1856, speaks of "the ever white Spinghar or Safid Koh," and again, of "the noisy babbling Kurram whose waters are as clear and crystal as the snow from which they come." I can't say I altogether agree with this, for there was no snow on the Safid Koh up to the middle of January, and it generally begins to die away by the middle of June, all having gone as a rule by the middle of July or beginning of August; and again, though the waters of the Kurram are noisy, they are at the same time decidedly dirty, with a great deal of mud and sand in suspension, at least they have been so ever since this Expedition has been

in the valley. The mountain streams are certainly some of them as clear as crystal, but even many of them become muddy and dirty as they near the larger river. Of course the snow remains longer on the north side of the Safid Koh and may be all the year round there, but that is not visible from the Kurram Valley.

In Khost the principal rivers are the Shamil, the Matun, the Zumba, and in the Jaji Maidan territory the Jaji Maidan River. The Shamil rises in the Jadran Hills and flows easterly to Matun, where it is met by the Matun River; it then continues its course, easterly still, until the Zumba or Kam Khost River flows into it near Arun Khel, and about 4 miles beyond this it turns in a southerly direction to Laram, where it again turns easterly and flows into the Kurram near Zaron, south of Thal. The Matun and Zumba or Kam Khost rivers both rise in the Gabar Mangal Hills, and both flow almost parallel in a south-easterly direction; the former joining the Shamil at Matun, the latter at Arun Khel. The Jaji Maidan River rises on the south side of the range of hills between the territory of the Makhbuls and Jaji Maidan, and flows through the latter territory in a south-easterly direction, joining the Kurram River near Hazar Pir.

Roads.—There are many roads, none of them very good in a military point of view; and of course there are several over passes only fit for foot travellers, which we do not yet know.

The principal and most important road is that from Thal, now improved by the British; it leads by the village Mandoria along the left bank of the Kurram, and by the Alizai and Shinak to Kurram. The old road from Thal used to cross to the right bank of the river at Kapiunga and continue along that side, and was at first made use of till the British improved the other; it used to pass by Ahmed-i-Shamu and Hazar Pir, and cross the left bank above Shinak and so to Kurram.

From Kurram the road runs across an open dry plain to the village of Habib Killa, a Durani cantonment, and thence up the Paiwar range to the Paiwar Kotal. The walk from Kurram to Habib Killa is the longest march a man can take, i. e. it *seems* so. It is only 13 miles, but going either way you see your destination the whole time, and it seems quite near when you start, and never any nearer for every step you take; it is more tiring to march from one to either, and back, than any other 26 miles I know of.

This same road then passes over the kotal, and running down the western side between pretty wooded spurs it goes by Zabardast Killa, and Bian Khel, to Ali Khel, keeping on the left bank of the Ariob River. Thence a road turns along the Hazardarakht stream, passing Rokian, Dreikula, and Jaji Thana, over the Surkai Kotal, down into the valley on to Kasim Khel, Hazratt Thana, and on to the Shutargardan. Thence the road runs by Dobandi and Kushi, into the Logar Valley, and then northwards to Kabul. This is considered one of the

great roads, and is of course the one that will now be of most importance.

To return again as far as Kurram, we have another important road, and that is the continuation of the Thal one, along the banks of the Kurram, past Keraia, through the Chakmanni country, by Lajhi to Ahmed Khel, thence up the Ghunzai or Surki River, over the kotal of that name, and on to Ghazni.

After the Surki Kotal is passed, the road branches off to the Tera Gawi Kotal, and thence to Kabul. The first portion of this road near Chakmanni and Lajhi is dreaded on account of the robbers, or otherwise it is the best road to Ghazni. It was by this road, and over the Spiga Kotal, that Mahomet Azim Khan, the old ruler and builder of Kurram Fort, brought the guns to Kurram. The name Altimor is used by General Abbott, and I believe this is the summit, and Tera Gawi the foot of the pass.

To return to Ali Khel again, we find a road along the Ariob River by Karmana, Secunder Khel, and Dapozai, joining the road over the Spiga Kotal, near the Ahmed Khel Tangi of the river.

Let us start now at Ahmed-i-Shamu, on the old road between Thal and Kurram, and we find a road running by Shobakghar and Landiah, on the Shamil River, and up that river to Matun. This continues along the river into Jadran. Again from Hazar Pir a road runs by Jaji Maidan and Jaji Danni, by Bakh, and south to Matun. This is the principal road into Khost. Where the Zumba River cuts the last named, a road branches off to Sabori.

Again, starting from Hazar Pir we have a road passing through the Jaji Maidan country, and then turning north, and crossing the Darwazagai Pass, comes out of the hills, to the Kurram Valley, a little east of Kurram Fort. At Sadar, where the Karmana River joins the Kurram, a road goes along the former stream into the Mozazai Valley; but I cannot say we know anything about it. Nor do we know any more of another road starting from the same place by Dandoghar Mountain, and on to Togh.

There is a road from Kurram by Zeran village, and over the Aghane Pass of the Safid Koh, and on to Jalalabad, which we have only seen as far as the pass. The same holds for the important road running by Bian Khel and Belut along the Laridar River, by the Lakerai Kotal, into the Babar Ghilzai territory of Azar and Esarak to Jalalabad.

The Ghogazai route to the Logar Valley passing by Mir Alum's Fort is another road, avoiding the Hazardarakht route and the Surkai and Shutar-gardan kotals, joining the Hazardarakht route at Dreikula. Captain Rennick, the political officer of the Ariob, tells me he thinks the telegraph ought to be carried into Kabul by this route, as it would avoid the snow-drifts of the Akund defile and the storms of the Shutar-

gardan. The portion of this road from Ghogazai to Mir Alum is not good, however, being as bad, if not worse, as that by Dreikula and Jaji Thana, though the remaining portion (as I mention further on) inspected by Captain Rennick and myself, i. e. from Mir Alum to a kotal north of the Shutar-gardan, is excellent.

Besides all these roads, there are several minor or contraband ones, such as across the Mangior Kotal from Ali Khel by Sapri to Keraia on the Kurram River, and that by the Isteah Pass out of the Ariob Valley to Isteah on the Kurram.

Towns, &c.—The principal villages (they really cannot be called towns) we have met with are Kurram, Ali Khel, Habib Killa, Sali Mahomet Khan's Killa, and Matun in Khost. These are perhaps a little larger and more important than some of the others, but all are really very much alike, being composed of mud houses surrounded with a mud wall. Kurram, Matun, and Sali Mahomet Khan's Fort, in Chakmanni, have pretensions of being "forts," however. Kurram is the largest. Kurram Fort is a square mud fort, having towers at the corners and in the middle of each side; rooms are built for the garrison all along inside the walls, and there is a place for a bazaar, and an inner square mud building for the magazine. It was built originally by Mahomet Azim Khan, and used to be called by his name. All other forts are, as I say, on much the same principle.

The villages even are similar, and fortified to some little extent. They are, of course, built of mud with thick walls, and the dwellers try their best to make their exits and entrances as difficult as possible. In some places that I have seen, a man has to clamber up some feet, and go through a hole to get to a room. For light and air in their rooms the villagers have holes (about a foot square) made high up in the wall, so as to be out of the reach of a man outside, as they apparently never can be sure when an enemy may be near, and one playful custom is for a man to put his gun through the hole, if he can reach it, and fire into the room at night. I have seen many of these little holes provided with small iron shutters. The villagers light their fires in their rooms, and have no chimneys. I have slept in their rooms under such circumstances, and have experienced the pain the smoke causes to the eyes; but I was told that one soon got accustomed to it, and that the watering of one's eyes was very good for them!

Climate.—The climate generally of the Kurram Valley is that of the Punjab, only severer in its extremes. There is a very severe winter—of course, far severer than that of the Punjab, the thermometer having gone down to 5° Fahr. in December last, and having averaged 12° to 15° Fahr. often during the night. Even in April it has been as low as 27° Fahr.; and yet this was not considered a severe winter, but rather the contrary.

The summer is very dry and hot, and the rainfall small. It may

be imagined that in the valleys such a climate must be very trying and I personally have my doubts whether this will be found so healthy a country as many seem to expect. We have been knocking about in tents for some time, and the men, both Europeans and natives, are as hard as nails, and in rude health, so one cannot judge from this what troops will be like when living a sedentary life in a cantonment in these valleys.

Our native followers suffered most from pneumonia during the intense cold, and the Europeans stationed in the valleys would probably suffer more from the heat, if it were not for the grand pitch of training to which they have been brought. There are, however, hills all around, and quite close at hand, and I allow that such air as one can obtain on the Paiwar Kotal and other spots is simply life-giving.

General Description of the Country.—The country round Thal is like that of the Punjab Salt Range, the hills being for the most part barren and all vegetation scarce, the mountains having only a few stunted shrubs on them; except in the ravines and the foot of the hills, where, being protected, there are a few trees. This, of course, is to be expected, owing to the severity of the winter and the want of moisture in the air at other times. One large hill, Kadimakt, on the left bank of the Kurram, rises over Thal to about 4900 feet. A little distance out of Thal we begin to get more vegetation, and the hills have a little more scrub jungle on them.

When we arrive at Kurram we find ourselves in a large, dry, open plain. The fort is situated in this plain, so dreary, dry, and ugly, that the mud huts of the villages being almost the same colour as the ground can hardly be distinguished at a short distance, and were it not for the loose stones and boulders lying about, against which one's feet continually knock, and which add considerably to the bootmaker's bill, one might imagine it (as far as the valley is concerned) the plains of the Punjab.

But there is happily something to break the monotony of this scene, and that is the hills around; first among which is the beautiful range of the Safid Koh. At Kurram this range is visible from Sikaram on the west, bearing away to the east, and beyond a fine pointed peak called Keraira, just a little north-east of Kurram, till it is lost to view; but looking back, down the river, we see the hills we have already passed on our way from Thal, and the mountains (one grand fellow among them) of the Zaemukt country, besides other large hills, and one feels oneself repaid for living through the dry heat, the cutting cold, and the dusty storms (we always had one of these at Kurram) by the enjoyment afforded us by the varied beauties of these glorious ranges.

Early in the morning, and at sunset, we always had some picturesque effect to entrance us. Perhaps silver grey and soft shadows, perhaps deep reds and purples, perhaps black angry clouds floating over the tops of the

mountains, with white masses half-way down them ; whatever the state of the weather, whatever the light, we could every day find and enjoy some new beauty in the mountains. Nevertheless, although I admired the hills and loved to look on their ever-changing beauties, I could not but wish that the hideous foreground, which it made one thirsty to look at, could be changed for something more in accordance with my ideas of what the country behind it deserved.

On our way to the Paiwar Kotal we pass a village at the foot of the Safid Koh, called Shaluzan, about 5 miles east of the old Durani cantonment of Habib Killa. I cannot pass this without mentioning it, for it is indeed a lovely spot. Situated at the foot of huge mountains rising over 15,000 feet ; hid among a forest of walnut-trees, with little temples built on the points of the various underfeatures, with many clear-sparkling mountain streams rippling along, and its quaint little mud huts, it is one of the most lovely and picturesque spots I have ever seen. One can sit under the shade of the various trees there, and they are many, and imagine there is no hideous dry, hot plain beyond, for all one sees is pretty, green, soft, undulating ground ; sunlight falling between the trees, glimpses of the snows of the Safid Koh, the sparkle of the crystal water, and perhaps here and there a group of men clothed in their picturesque garb. The inhabitants always look *right*, they are always in the *right* place, they always sit or stand in the most picturesque way, and their natural unconsciousness makes their positions all the more easy and graceful. Their dresses are of lovely colours ; generally they are of a deep, almost invisible blue, with some other shade of the same, or perhaps some other bright bit of colour put in here and there to relieve it. They seem unconsciously always to put in this bit of colour in the right spot, and the dirt with which they are all covered seems but to improve the richness of the hues. Add to this the quaint weapons and strange faces of the men (some really very handsome, like fine old Jewish heroes, others "hang-dog," or crafty), and the fact that, group themselves as they will, they seem always to improve the scene, and it can be imagined what a fairylike spot this seemed to us.

While talking of Shaluzan, I should mention the fact that on the 26th of May, just after the Queen's birthday, and a little before peace was signed, the Commander-in-Chief of the Pattiala Contingent gave a picnic in the name of H.H. the Maharajah, to the General and almost all the officers of the column (i.e. as many as the distance to be got over, or duty, would allow to go). It was a most hospitable and generous act, quite worthy of the liberality of native princes, and a pretty courteous wind-up of the excellent service they and their men have performed as long as they have been with the force. They had most trying and difficult duty to carry out, in keeping our communications open, and escorting supplies ; and it was most gratifying to see the pains

they all took, both officers and men, to do everything in their power to help. The alacrity with which they worked, their zeal, and intense anxiety to please, was noticed and was talked of by every officer from the General downwards. It was their misfortune (at least I expect the men themselves thought so), that there was no more fighting to be done, and considering what a good stock they came from, and what fine, powerful, muscular men they were, I think the enemy would have found them very ugly customers to deal with.

But to return to our picnic. It was no ordinary entertainment, and the expense must have been enormous, when we remember that luxuries of all sorts were in profusion (including champagne, ice, and soda-water), luxuries that were certainly not procurable in Afghanistan. A photograph was taken of the party, and after that we had some wrestling. The two best bouts were between a Pathan and a gigantic Sikh, the latter winning, and being in consequence challenged by another Mussulman later on, but the Sikh again was the conqueror.

We heard that Shaluzan was famous for its lovely women, but as I never saw any of the fair sex at all, it is impossible to pass an opinion on their looks. I am now afraid that the charms of this picturesque spot will soon be at an end, as a military cantonment is being laid out quite near it, which means ugly barracks, hideous houses, cutting down of trees, and generally destruction of all that is lovely as far as it is possible to destroy it.

The Paiwar range, as before mentioned, is really a spur running south from the mountain Sikaram. It is a well-wooded spur rising in one part, north of the kotal, to a point about 9400 feet high, and decreasing in height by a series of small peaks till it arrives at the kotal; from there the range begins to rise again, running south, and being crossed by several passes leading from the Ariob Valley into the Kurram Valley proper, the principal being the Isteah, Strimander, and Drak Algar, and finally ending in one fine hill called Mandeha, about 11,000 feet high, just over the village of Keraia, on the Kurram, and overlooking the Mangior Defile. On the opposite side of the kotal, i.e. the western side, long spurs run down, and the scenery begins to wear a more pleasant aspect, one of these spurs running along parallel with the Ariob, and helping to feed it by many very small streams. From the Isteah Kotal runs down another stream, and on this same bank one more stream also flows, called the Ali Khel, nearly parallel to the last, and both fall into the Ariob before we reach Ali Khel.

From the Mandeha range, as I shall call this southern and high portion of the Paiwar range, runs out a spur on which is the Drak Algar Pass, mentioned above, and this spur rises at the other end to a point about 10,800 feet, visible from Ali Khel. All these hills being thickly wooded, with a large amount of deodar, and in places being steep

and precipitous on the river bank, cause this side of the Ariob to be very pretty and effective.

The country on the right bank of the Ariob, after passing Zabardast Killa, is more open, rising gradually to the foot of the Safid Koh until we pass Bian Khel, when we begin to see the effects of the spurs from Matungeh, a noble mountain, 12,800 feet high, which stands over Ali Khel in a direction nearly due north.

The Safid Koh range from Sikaram runs for about $4\frac{1}{2}$ miles north-west, and then, the edge ending rather sharply, strikes off into two branches. One spur runs northwards, where it has one or two well-marked peaks, and gradually dies away, forming part of the watershed of the Surkab River, which flows north to Esarak and then east to Gandamak. The other spur continues to drop steadily to the Zera Kandai Kotal and thence to the Lakerai Kotal. The former is a bad pass, and very steep and difficult to climb, while the latter is an important pass about 10,600 feet high, and is the best road across from Ariob to Jagdalak and Gandamak. After this, the range turns southerly somewhat, and begins to get higher and higher until it culminates in the hill previously mentioned north of Ali Khel.

There is a peculiar formation of three plateaus near Ali Khel village, owing to the drainage into the two rivers, Ariob and Hazardarakht, that meet there, surrounded by smaller hills; these plateaus made capital encamping grounds. One of the most exquisite views we have had was from the top of one of these small hills, looking up the river towards Paiwar Kotal.

The village of Ali Khel lies beneath, on the banks of the river which you see winding away in the distance, with small villages dotted about on its banks, and surrounded by green rice fields and orchards. Matungeh stands on your left, black and frowning, with scanty vegetation on its lower spurs, while nearly the whole range of the Safid Koh, from Sikaram, lies before you, its many spurs running out in all directions and taking various hues—lit up here, in shadow there. And again, on the right, the well-wooded ranges from Mandeha to the kotal give a variety of tints in the colour of their foliage. I should be sorry to say how many men have tried to sketch this, and how many have come far short of doing justice to its beauties—failed in fact for lack of power in their brushes, as I feel I have failed from lack of power in my language.

All this part of our course is well cultivated, rich in barley, rich in rice, the villages surrounded by fruit-trees, and most of the fields watered by a most laborious system of irrigation from the river.

Now let us turn up from Ali Khel and look at the country by the Hazardarakht stream. The hill Saratega I should guess to be about 12,000 feet high, lat. $33^{\circ} 54' 45''$, long. $69^{\circ} 31' 59''$, situated a little south-west of the Surkai Kotal (Red Kotal), on the way to the Shutar-gardan.

The spurs from this high mountain run down for 12 or 13 miles, of course each one forming almost a range of its own. One of these spurs runs down to the Ali Khel, ending in small undulating features; but as we go up the Hazardarakht stream towards Dreikula we find these spurs end more abruptly, forming much steeper banks, and having less vegetation.

The opposite bank is formed by a large spur from Matungeh with peculiar pointed hills and strangely shaped features. Opposite Dreikula village, at the meeting of three streams (as its name "three-mouthed" implies), there is a strange set of rocks standing up like a wall or a series of broken columns, some ending in sharp points. Near Dreikula the pine forests begin again, and all up the Hazardarakht stream, nearly to Jaji Thana, the forest is thick, and both banks of the river steep. On the way from Ali Khel to Dreikula we pass on the right a village, Rokian, famous for its wheat and apples.

From Jaji Thana to the Sirkai Kotal the country is again rather barren and the hills bare. Crossing over the Sirkai Kotal we descend into a green plain and arrive at Hazratt Thana or Kasim Khel, from which we go to the Shutar-gardan Kotal; and all this part of the country is again rocky and very bare; the ascent up to the Shutar-gardan being very gradual on this side, but being remarkably steep on the other side down to Dobandi. From what I could see from the kotal, there was a descent practicable into a rich, fine land; but I had gone as far as I could be permitted.

Let us start once again from Ali Khel, and go down the Ariob River still further. We pass a pointed hill, well wooded, on the left, called Uth Mander, at the foot of which is Mirak Shah's Fort, a person whom I shall have to mention further on; and by this passes the road to Chapri, or Sapri, and over the Mangior Kotal down the defile to the Kurram River. Continuing down the Ariob, we pass Karmana, from which village is another road to Sapri. Then we come to Secunder Khel, an important village, and at about 10 miles from Ali Khel the large village of Dapozai. All the left bank is formed by well-wooded hills, rising between 10,000 and 11,000 feet high, and rather steep at the river edge, but going off into long ranges and spurs, and rising a little again, and then finally dropping down straight, forming steep banks to the Kurram, near Lajhi. The right bank of the Ariob from Ali Khel to Ahmed Khel is formed, like the right bank of the Hazardarakht, by the long spurs from Saratega, only in this case they do not run down so closely to the water's edge, and slope more gradually. These slopes also are wooded some few hundred feet up, but not very much so nearer the bottom and the river.

A short distance beyond we come to the important feature of the river, described before, called the Tangi, and here the country is naturally all rocks, and very barren, the sides being most precipitous,

but the Ahmed Khel villages have fields down on the river side, and many along the Surki stream, all reclaimed by immense labour from the waters.

The sides of the Surki stream are well wooded, and on the left bank are formed by the spurs from Saratega Mountain, and on the right bank by spurs from the high hills behind the Ahmed Khel villages. But, as I said previously, the country round the Tangi and on to Lajhi is, on each side of the river, very bare, rocky, and wild; the banks being very precipitous and the river very narrow and winding considerably. Passing Lajhi, and getting into the country of the Chakmannis, or Chamkannis, we begin again to get into a well-wooded and fertile land, and so on to the mouth of the Mangior Defile, and by Isteah back to the foot of the spurs from Mandeha and the end of the Paiwar range. In going along this route we pass two rivers on the right bank, up which I have been, one the Gabara River rising in the Gabar Mangal Hills, and flowing into the Kurram opposite Keraia, which is full of villages, and most excellently cultivated for some 8 or 9 miles, until we begin to leave the Chakmanni country and enter that of the Gabar Mangals, where we get more rocky, hilly country, and naturally wilder. It is curious to notice how, with few exceptions, these independent, wild robbers seem to live in the most difficult country.

The second river we passed was the Zigor, which rises in the Makhbul country, but which is not nearly so well cultivated. When we went with the General and his staff up this river on a reconnaissance with a cavalry escort, we found it difficult to get any water for the horses; though at last the villagers showed us some black stuff they *called* water for the quadrupeds, and many of us bipeds drank boiled milk brought from the village. We had not long to complain of want of water in the Makhbul country, for a tremendous thunderstorm broke over us, and we were all well soaked before we got home. Disagreeable as it was, however, when the yellowish-green light from between the black clouds lit up a few peaks here and there, and the lightning, now and then quite dazzling, was followed by a clap of thunder that was taken up by the echoes and rolled along from hill to hill for some minutes, I thought the Makhbul country a far finer bit of territory than I had in the early morning, when all looked dry and uninteresting.

Khost lies to the south and west of the Kurram River, and behind the range of hills on the right bank of the Kurram. It is bounded on the north by the Jaji Maidan and Gabar Mangal hills; on the south by the Waziri Hills; on the east by a range between it and the Hasan Khels and Darwesh Khels, and on the west by the Gabar Mangal and Jadran Mountains. Khost is also split up by low ranges of hills running across from east to west, dividing it as it were into three principal valleys, which are flat, and the soil alluvial. About Matun the country is very well cultivated, a good deal of irrigation being

carried on, but the natural growth on the hills is spare, being small scrub jungle.

Peaks and Places of Interest visited by the Survey.—The principal peaks visited by Captain Woodthorpe and myself have been, Bodin, 14,000 feet, lat. $33^{\circ} 58' 57''$, long. $70^{\circ} 15' 8''$; Matungeh, 12,800 feet, lat. $34^{\circ} 0' 29''$, long. $69^{\circ} 45' 7''$, this on two occasions; the Lakerai Kotal on the Safid Koh, 10,600 feet, lat. $34^{\circ} 5' 10''$, long. $69^{\circ} 50' 30''$; the Shutargardan, 10,800 feet, lat. $33^{\circ} 56' 30''$, long. $69^{\circ} 24' 50''$; Sikaram Peak, 15,600 feet, lat. $34^{\circ} 2' 21''$, long. $69^{\circ} 56' 35''$. I trust before this is read that Sikaram will have been ascended a second time, and also that Keraira, a very pointed peak over Kurram, and on the Safid Koh, also will have been observed on. We have had an idea for some time that this last point was higher than Sikaram, but since we have been up the latter we have abandoned the notion, although it cannot be far below the same height: this point, Keraira, is in lat. $33^{\circ} 58' 26''$, long. $70^{\circ} 16' 42''$.

This will make six ascents of the Safid Koh by the officers of the Survey with this column, those to Bodin, Matungeh, and the Lakerai having been made, as far as I know, before any other officers of the army had attempted them. The honour, however, of being first on the top of the highest point, Sikaram, lies with Mr. Scott of the Survey Department attached to the Peshawur division.

As some of our trips may be interesting, I will briefly give an account of one or two.

Captain Straton of 2nd battalion 22nd Regiment, in charge of the signalling (he relieved Captain Wynne, 51st Light Infantry, who was in charge of the signalling formerly, but went home), has accompanied us on all our trips of any importance or where there was a likelihood of danger, in order to keep up communication with the troops. While mentioning signalling, it is strange more men do not know it. We have used the heliograph under the name "heliotrope" for many years in the Survey before it ever came into use in England, and for triangulation it was very useful. It cannot be expected that in England the heliograph will be as useful as in this country, but considering how much can be done with it, and how much we have to do with Eastern countries, we ought certainly to have many more officers and men, not only *able* to communicate, but able to talk with ease. A 5-inch heliograph has been used to communicate at a distance of 75 miles out here, and there is no reason why a 6-inch heliograph should not be read at 100 or 150 miles. Captain Wynne on this expedition has kept up communication with a 3-inch Mance heliograph at 34 miles. Captain Straton also has read a 3-foot flag at 25 miles with a good telescope. We certainly have found this on many occasions of great use to us.

One of the 72nd Highlanders, Corporal Eason, an excellent signaller,

a first-rate shot, and good walker, has been with us also on every occasion of importance, and on every ascent of the Safid Koh; except when we visited the Lakerai Kotal, when no one but Captain Woodthorpe and myself went, as the General wished our visit to be kept as secret as possible.

The second trip to Matungeh was made on the 24th of April from Ali Khel. Major White, of the 92nd Highlanders, Captain Woodthorpe, Captain Straton, and myself, accompanied by Corporal Eason and three signallers of the 72nd Highlanders, started from the village at about 5 A.M. Ali Khel is about 7300 feet high, so we had a climb of about 5500 feet before we reached the top, and we were not very near the foot of the hill, and so had some little distance to travel before our work began. We had had very severe storms for a day or two before, and the thermometer went down to 27° Fahr. at Ali Khel. These storms had prevented our going before on the 20th as we had originally intended. It was very cold therefore on the 24th, but perhaps not so bad as a few days previously. Toiling along a spur, we managed to reach the top in about five hours. For the last 1500 feet we had snow of some depth, but which luckily was only frozen in one steep place, and this certainly was a nasty little bit to get over; otherwise, except for the fact that making steps and so on delayed us, and the sinking of our feet in the snow where soft tired us, there was nothing dangerous. Perhaps the most trying thing was the glare off the snow, the sun being very bright; at least the next day I suffered rather from sore eyes. The cold at the summit was very great and the wind most cutting. Captain Woodthorpe took the observations with a 6-inch subtense transit theodolite by Troughton and Simms, which was a trying and annoying piece of work, for there being several feet of snow, the legs of the instrument would sink as the day wore on, making frequent readjustment necessary. I did the plane-tabling, but found it was no easy matter to draw with fingers that continually lost their feeling; and from standing still in the snow I was not aware of the existence of my toes. However, we had a good day and got through plenty of work, returning to the camp at Ali Khel comfortably tired and healthily hungry to enjoy commissariat rations in the evening.

On April 30th Captain Woodthorpe and myself, with thirty Gorkhas of the 5th, went to Belut, a village on the Laridar River, preparatory to starting up the Lakerai Kotal; as the General required a reconnaissance to be made of that route. We kept it as quiet as possible, and under the charge of Sarwar Khan, son of Mahomet Amin Khan of Gandeah, and a baddraggar (guard of villagers) of most cutthroat-looking villains, and leaving a few of our Gorkhas to take care of our camp, we started on our journey the next morning, the 1st of May.

A Pathan, one of the 5th Punjab Native Infantry, a havildar, by name Hazratt Shah, had been kindly sent with us by Major McQueen,

of that regiment, and he was most useful, having been along the route before, and being able to act as interpreter for us with the baddraggar. The first part of our journey was along the bed of the Laridar (or Lalidar) stream for 7 or 8 miles, and between thickly wooded spurs of the mountains; the river, like all mountain streams in this country, being full of boulders against which to skin one's shins. The road then turns a little to the left over a low spur, and following this up arrives at a small saddle. Here we halted for a few minutes to collect our men who had begun to straggle.

We had by this time begun to reach the snow which was about a foot or two deep in some places. The scenery of this portion was exquisite and quite Alpine in many parts. In the midst of a deep forest where the sunlight fell between the trees, the lower underfeatures of various colours were lit up in places by the sun, while in others they were rich in deep-coloured shadows, the dark pines all around and above looking blacker and blacker as you gazed upwards, in contrast to the snowy, glistening range of the Safid Koh behind them; the grandeur of the scene caused us to stop, and excited mingled feelings of awe and admiration. But what could one do? Even if I had the power to sketch such a scene, I had not the time, for speedy observation was necessary if we intended to do work and return in safety.

Combined with this, there were our ruffianly-looking baddraggar in their dark blue lungis, and with their quaint weapons, who at every halt cast themselves about in most natural and picturesque groups, always improving rather than spoiling the scene; so different from the European dresses of myself and companions, which made us appear out of place and more like barbarians than our guides were. Continuing our way along the spurs, we began to leave the vegetation as we got higher and into deeper snow, until we arrived at last at the kotal, about 10,600 feet. The northern side had very deep snow on it, and on asking how much there was generally in winter, one of our guides in explanation placed his hand as high as he could above his head. On this occasion it was about 2 or 3 feet deep. I did some plane-tabling and found it quite as cold as on Matungeh, but the villagers had brought some wood with them, and we lit a nice fire by which at intervals I warmed my fingers. We then went a short way down on the north side, so as to get a good view of the valley and the villages. There are some Mangal villages there, on the banks of the Surkab River, viz. Taghan, Langiar Killa, Sirket, and Nasir Mahomet, and our guides began to get anxious and begged us not to go too far; so, as we had a long walk back after having gone about a mile and a half down, we began our return journey. In the Laridar nuddee I forgot to mention one spot called Baguchina, a pretty green place with many springs of delicious water; and here we were told that bodies of armed men always encamped, and we rather disgusted our baddraggar by stopping here, as they said no one tarried

along the road between this place and the mountains, as it was a great place for robbers.

A short time after we had left Belut in the morning, and a short distance up the river, a shot was fired at us from the heights (it was amusing to see how our Gorkha guard "woke up," if I may so use the expression), but we sent the baddraggar up to crown the heights and continued on our way, finding no one and meeting with no other adventure. We took the same precautions coming back, and reached Belut quite comfortably, having had a most pleasant walk of about 22 miles through charming scenery, new country, and performed a satisfactory day's work.

Our trip to the Shutar-gardan on the 5th of May was not so satisfactory. We were rather a large party, with political officers (Colonel Gordon and Captain Rennick), and a large baddraggar mounted on squealing ponies. At the Sirkai Kotal I was able to do some plane-tabling, but after that, when we left Hazratt Thana and arrived at the Shutar-gardan Kotal I was not able to do much. I went up a small hill on one side, and Captain Woodthorpe intended to go over the kotal for some little distance to examine the eastern side, but I had only just fixed my position and begun work when I received a message to come down at once, the position apparently not being considered safe; thus I was able to do hardly anything in the way of topography. The slope on the eastern side is steep to Dobandi, and near that village the country appeared well cultivated, but all the country round the pass itself is very dry and barren, with very little snow, and none on the kotal itself at the time we were there, it lying but thinly on the adjacent hills. We slept that night on the ground of an upper room in a house in Hazratt Thana, and though I suppose I slept soundly enough, still I would not wish my best friends to have to do the same. I could dream of nothing but hopping, crawling, and voracious creatures, and often awoke imagining all sorts of horrors in that way; but we could not have brought our tents with us, and it would not have been safe to sleep outside, so there was no help for it but to try to sleep, and trust something would be left of us by the morning. On our return to Ali Khel the care we took not to let any of our blankets go into our tents previous to careful examination was as necessary as it was nasty, though perhaps amusing to those not personally interested. On our return journey, on the 6th of May, I took a small circuitous route with Captain Rennick and an old malik (headman of a village), to see the road to another kotal, north of the Shutar-gardan. The road to this, between it and Mir Alum Fort, is simply excellent; it is all springy turf, on which I galloped, but I could not go to the kotal to see the other side. The old malik said the road on the other side "was like the palm of one's hand," but of course I cannot vouch for the truth of this statement. If this is the case, however, it is simply a kotal that turns the Shutar-gardan, and I am sorry I was not allowed to survey the country all about.

The road from Mir Alum's Fort to Dreikula by Ghogazai is very bad indeed, but that between Hazratt Thana and Mir Alum is a good one; so that though I do not think the road to the northern pass could be used by troops until they had passed the Sirkai Kotal, yet it seems to me it might perhaps be of use after they had done so, for I think men could be marched back from Hazratt Thana to Mir Alum and sent by the other kotal without the defenders of the Shutar-gardan seeing them, and their attention could be riveted on their front defence; or again, anyhow, the offensive party showing that they had the knowledge of this route, would make the defenders inclined to weaken their force at the Shutar-gardan, in order to defend the other pass, as it leads to Dobandi, and attacks their rear; and, lastly, in any movement to concentrate force in one spot or the other, those in the attacking force would be able to move more rapidly and more secretly in the valley than the defenders could on the hills from pass to pass.

We did not always get off without a shot or two at us, and a little excitement. On one occasion, the 15th of June, General Roberts and his staff, accompanied by ourselves, with a few native orderlies, went on a reconnaissance up the Kurram, from Keraia village, intending to reach the Ahmed Khel villages, near the Tangi. Captain Woodthorpe, Captain Straton, and myself, under the charge of the Malik of the Ahmed Khels, were to sleep at their village that night, in order to work on some hills near there the next morning, while the rest returned to Keraia. For this purpose it was necessary we should go along the Kurram River by Lajhi where the Lajhi Mangals dwell. Lajhi, both villages and river, are on the south bank of the Kurram. The Mangals have always been independent, and have levied a tax or toll on whatever passed along that road, or robbed the whole. Political manipulation had, however, brought in many independent tribes, the Gabar Mangals among others, and just before the reconnaissance the Lajhi Mangals, or as they are properly called, Lajhwars, had sent in a Jirgha. Thus when we started some of the head men of the tribe of Lajhwars were actually detained at Keraia as hostages for our safe conduct through the Kurram.

We all started with a baddraggar, composed of Chakmannis, Mangals, Ahmed Khels, Makhbuls, Hasn Khels, &c. Troops, however, were not taken to Lajhi, but some were left some two miles short of that place in our rear. Our small party therefore advanced quite contentedly until, arriving at the mouth of the Lajhi, we found the Mangals jumping about like monkeys on the hills, and barring our passage. They at last fired into us, but shot badly. After some further talking (which had nothing to do with me, so I did not attend to it) the General determined to retire. We were not allowed to return their fire, and I dare say wisely, or I think we could have picked off a few of them. Soon after they saw us retiring they began to shoot at us, and as we went down the river they ran along the hill tops to follow us up.

At one time we cannot have been more than 120 yards from them, and how they missed us I cannot understand, certainly I allow their bullets came quite close enough to be uncomfortable, as far as we were concerned, but still it was very bad shooting on their part. Luckily no one was killed, two native orderlies and one of the baddraggar being wounded, and two animals hit; but had the General's or some other valuable life been taken this affair (which we have all laughed over since) would have been far more serious. I believe there is no doubt now that some of our own baddraggar amused themselves by firing at us. The Lajhwars, like the rest of the Mangals, have always been independent, and as long as they liked to be so, and fight it out, they could only be admired, but when they send in men as hostages, and are apparently willing to receive the party in a friendly way, and then on their arrival (in a narrow part of the river) begin to fire on them, their behaviour is hardly what can be called noble. I hear that other tribes say they consider it disgraceful conduct, and a breach of all their rules of baddraggar, but I do not know whether because they say so, it follows that they think so. I hear that they have since sent in a sum of money and sheep, and sworn to be our allies, and to keep the road open along the Kurram for us, but I suppose time will show the value of these oaths. Anyhow it is certain that our subjects must be allowed to proceed unmolested along the Kurram, if the valley is to be ours, and if our neighbours do not choose to let them, they must be taught by a lesson they can understand. Before peace was made they might have been fighting for their soil, but men such as the Mangals doing this after peace is declared and signed, means highway robbery.

On one other occasion, when two other officers were with Captain Woodthorpe and myself, and two signallers of the 72nd and six sepoy accompanying us, for survey on a hill near the Mangior Pass, some of these same Lajhwars and a few Ahmed Khels, in all about two or three hundred men, came into the valley below. Luckily these men had been firing on some grass-cutters just before, who were on the hills between us and our camp at Ali Khel, and had thus betrayed their presence. Here the heliograph came in useful, for General Cobbe warned us of this from Ali Khel, and told us he was sending out four companies of Gorkhas to our help. Soon after the enemy had seen us on our hill and got pretty near us, the Gorkhas arrived in the valley below, and so they took themselves off after firing about fifty shots at us, nearly all of which went over our heads, while we had the grim satisfaction of knowing afterwards that they had lost one man for their pains.

Ascent of Mount Sikaram.—We went to Sikaram (15,600 feet) on June 26th. I have endeavoured to find out the real name of this mountain, but without success. Some say the name is Sheik Harm, others say there are no sheiks, and never were any here, and that it is not its name;

others call it Setaram, but I think the generally received name is Sikaram, as they say it was given by the Sikhs.

The night before the ascent we encamped at Sirgal, a village northwest of Zabardast Killa, and about 5 miles (as the crow flies) from the hill top. We had intended to go part of the way up the first day, but owing to our being delayed at the Ali Khel, and not arriving at Sirgal till late, we had to stay at that village for the night. We also had some little difficulty about getting villagers to carry up our bedding the first portion of the journey; and *en passant* I may remark this is the worst country I have ever visited in which to get a man to carry anything; not even a water bottle. They certainly are ready, on payment, to help in a way, but their gun, their pistol, and knife are the only things they apparently consider they ought ever to pick up.

As the chance of fighting with the Amir became less and less, officers were continually asking leave to go with us on our expeditions, so we often had company. On the present occasion we had a large party, for, being the biggest hill, there were many who wished to make the ascent. It consisted of Major White of the 92nd Highlanders (an officer who, whenever duty or distance from his work did not prevent him, always tried to get leave to accompany us for his own pleasure, and very good company he was), Captain Straton, our two selves, seven other officers, and the Rev. J. Adams, the Chaplain of the force. There were also four men of the 72nd, four of the 92nd, and two of the 67th. These were all the Europeans of the party. Besides these there were our men carrying the instruments, natives from different parts of India. These men did not all reach the top, and among them, I am sorry to say, the man with our lunch.

My plane-table was carried up excellently by a man who has been with us everywhere, a native of Ghazni, and the best walker among our native followers. Of the Europeans, all reached the top except two officers and one man, who were not in the same good training as ourselves. Major White, the first of the party, reached the top at 9.30 A.M., having left Sirgal at about 4 A.M., and the others came in at various times afterwards. Considering that Sirgal was 8800 feet, leaving 6800 feet direct ascent, and that there was a small range to be climbed and descended before the final ascent commenced, I do not think this was very bad work, especially for men who were not practised mountaineers. But especially good was the day's performance for the soldiers, who brought up their rifles, and twenty rounds of ammunition per man.

A good deal of marble strewed the beds of the streams at the foot of the mountain, and near the top there was a quantity of loose shale, most disagreeable to climb; but the wind up of all consisted of crag climbing, broken here and there by a sloping bit of snow, which had to be crossed. In many places this was frozen, but there was always enough surface of snow over the ice to give one a footing. Thus, except that it

was a very tiring, long climb, it was not so formidable as it promised to be from below. The north side of the mountain had much more snow on it, and went off in long slopes, nothing near so steep as the southern side.

Unfortunately we had not a very good day; we could certainly see the Hindu Kush, but not very clearly; the Kurram Valley had a mist over it which hid the furthest hills in the direction of Thal. We were in hopes of being able to see the mountains north of Kashmir near Gilgit, but on such a day of course they were not visible. We did what work we could however, though not so much as we had expected, and left about 3 P.M., all arriving at Sirgal again in time to get over our meals comfortably, and turn into bed. We can only hope our next visit to this mountain and to Keraira will be more fortunate, though I fear we run the risk of most days being hazy now.

Vegetation and Vegetable Products.—It may be expected that, with a climate of such extremes as I have described, vegetation is scanty. Kadimakt, for instance, the hill above Thal mentioned before, would be far better clothed if it were in the Punjab Salt Range; and towards Kurram the nakedness of the land increases.

The olive is rare from Kurram to Shaluzan, growing only near houses and holy places; its place at Thal is taken by the *Reptonia buzifolia*, which bears a remarkable resemblance to it. The scrub jungle from Thal to the Ariob consists of daphne, sophora, and cotoneaster, the latter being found among most of the pines at 10,000 feet. The chief Punjab forms are soon lost ascending the valley, and at Ahmed-i-Shamu *Acacia modesta* and *Dahlbergia Sirsori* are last seen. *Periploca aphylla*, however, is found up to Kurram, and is used as fodder for camels. *Pistacia integerrima* and a small *Rhus* are also found.

Trees occur near houses, and where irrigation is largely employed, as at Hazar Pir. We find in such situations fine specimens of *Platanus orientalis*, olive, celtis, and the chamaerops palm-tree, which increase in size going up the river; but the last gradually disappears, except near the Darwazagai Pass, where it forms a thick, dense, olive-like scrub jungle. When this palm is not cut, it forms a thick, branching tree, from 15 to 16 feet high, and this is especially so near holy places; there is an example of it within the walls of Peshawur, near one of the gateways. It also extends largely into the Khost country, and in the Kurram Valley the fibre of the leaves is usually the only source of rope, it being made from leaves brought from Khost. Where the rivers leave the hills and there is protection, as at Shaluzan, vegetation is most abundant; the trees there grow to a considerable size, and are also healthy, for owing to the dryness of the climate they are not affected by the numerous lichens and fungi as in Kashmir. There are chunars (*Platanus orientalis*) at Shaluzan and in the neighbourhood with a girth of 14, 16, 18, 25, and one of 35 feet.

Dr. Aitchison (who was appointed as botanist to the force, and whom I have to thank for all my botanical information) says that the walnut-trees near Shaluzan are finer than any he has ever seen, many trees being upwards of 10, and some 17 feet in girth. The amlok (*Diospyros Lotus*, L.) is very numerous, and is a good tree, its fruit being considered next in value to the walnut. Apricots, plums, apples, pears, grapes, elæagnus, a few peaches, quince, pomegranate, and almonds are found here. Mulberries are grown for feeding silkworms with, and are not very numerous, though they are fine trees; they seem to me to be more numerous in the Ariob Valley. A cypress of great girth and age is seen growing on the side of a hill close to Shaluzan. At 6 feet from the ground its girth is 6 feet, and the tree is visible at a great distance.

The scrub jungle between Kurram and Shaluzan consists of daphne, cotoneaster, sophora, some berberis, species of Labiatae and Compositæ, and artemisia in plenty. *Convolvulus lanuginosus* is profuse, growing on small hummocks, all the way from the Punjab Salt Range to Ali Khel. Dr. Aitchison says that many of the Astragali found here are Tibetan in type. On the hills with a southern exposure, the first thing met with is *Quercus ilex* at 7000 feet as a thick bush; higher up it is more like a tree, and we have deodar, *Pinus excelsa*, and *Abies Smithiana* gradually forming a dense forest, when *Abies Wilkiana* appears, mostly near the ridges, at about 11,000 feet, and then the forests thin off and gradually cease. At 9000 feet *Quercus ilex* is pushed out by *Quercus semicarpifolia*, the latter often driving out the pines, and forming a forest of its own. East of Shaluzan we get *Juniperus excelsa* and *Pinus Gerardiana*, the tree from which the chiolgoza nut is obtained.

Dr. Aitchison remarks he has seen no *Pinus longifolia*. *Pinus excelsa* is called in Pashtu, "makhtar," and *Taxus baccata* in the Ariob district is called "serap" or "serpah." The deodar is very fine, forming splendid forests, this tree being quite three times as numerous as any other. It is curious to notice how the forest of pines is directly got at through the *Quercus ilex*, there being no intervening forest as in the Himalayas. As already mentioned, the forests extend to about 11,000 feet; but here they are less dense and a few shrubs of rhododendron, the gooseberry, a currant, with a bush juniper (not *excelsa*), some willows, and honeysuckle (*loniceras*) fill up the vacant spaces. At higher elevations still the bush juniper with the birch (*Betula Bojputtra*) alone remain, to be afterwards superseded by rhubarb, eremuri (allied to the Asphodel, having a pretty spike of yellow flowers), also tulips (*Fritillaria*), Cruciferae, and rushes (*Carices*), with some grasses. Vegetation on this southern exposure is not stopped by perpetual snow, but it is kept down in altitude by want of moisture in the soil and in the air; but, as Dr. Aitchison says, if snow existed all the year round, the vegetation would ascend higher than it does at present. The same

authority also states that between Thal and Shaluzan he has seen only one fern, the *Adiantum Capillus-Veneris*.

On the northern exposure we find the pines descending to form a natural forest much lower down than on the southern side, and deodar and *Pinus excelsa* occur at 6500 feet. The forests are thin, with a great deal of scrub and underwood. We find at first the daphne, sophora, cotoneaster, berberis, the *Fothergilla involucrata* (a Kashmir type), coleaster, several roses, Buddleia, a small tree like the almond, several large Astragaloid Leguminosæ, another large berberis, jasmines, honeysuckles (*loniceræ*), and the pomegranate, all mixing with *Quercus ilex* and a profusion of grasses.

In the Strend Toi stream Dr. Aitchison found the walnut as a fruit-tree quite wild and perfectly natural, as proved by the fruit. At altitudes between 8000 and 9000 feet the rhododendron, eleven species of ferns, with podophyllon, and quantities of *Hedera helix* were met with.

Now let us advance towards the Paiwar Kotal. On the ascent of the kotal, at the base, we meet in the valley near Turai village a dense jungle of *Quercus ilex* (which is covered with a species of mistletoe), but mixed here and there with *Juniperus excelsa*, which last, a little further on, is found as a tree. We also find the same daphne, cotoneaster, and sophora as before, and the small yellow rose and Buddleia. Ascending, the deodar becomes numerous and the oak has become a tree, and *Pinus excelsa* with *Abies Smithiana* forms the forest. Here also we find the ash. When fairly in the kotal woods, we meet with *Abies Welbiana*, but not before. In these woods, except the two oaks as bushes, *Quercus ilex* and *Quercus semicarpifolia*, there is no undergrowth. *Pinus Gerardiana* is not met with here until we arrive at the lower edge of the forest with a northern exposure, and there it is plentiful.

The deodar forest, from the Spinghar Kotal, and for many miles, is superb; almost unlimited in extent, and capable of being made great use of. Descending the Ariob, the right bank is well cultivated, and the left is nearly bare until we arrive at Ali Khel. The plane-trees and vines do not grow just here, and the walnut at this spot is rare as a tree. In the bed of the stream is the willow (*Salix Babylonica*), which with a naturally wild *Salix* is cultivated to protect embankments for irrigation purposes. Hippophaea is cultivated as a hedge, elæagnus is common, and apricots, plums, apples, and a few pears are found. Also as before we have daphne, sophora, two species of cotoneaster, the single yellow rose, a sort of gooseberry, a species of coleaster, and lastly a very handsome laburnum (like Astragalus), called jirril. The bark of this cut off in rings is employed by the natives to put round the sheaths of their knives in place of brass. The fern chiefly met with in the Ariob Valley is the *Asplenium ruta-muraria*. The forests would probably grow down to the water's edge, but for the fact of their being cleared for wood and for irrigation purposes.

The cultivated trees are *Populus alba* and the before-mentioned *Salix Babylonica*, besides a species of poplar new to Dr. Aitchison. In the Kurram Valley two crops are grown during the year; the first barley, wheat, and a kind of clover; the second rice, maize, millets, tobacco, peas, a little opium, and some cotton. Most of the villages also have orchards.

In the Ariob only one crop is grown (except in Ahmed Khel where there are two), and this one consists of wheat, barley, maize, rice, millets, pulses, and clover. Tobacco is occasionally planted, some vegetables, a little opium, oil seeds, and some peas. Hasn Khel and Ahmed Khel produce the best grapes, but the people are so poor and so greedy they never let them ripen. Rokian has by report the best wheat and apples.

In actual gardening little is done; onions, a white radish, and some members of the melon tribe are sown, and flowers are raised for ziarats and holy places. These include the red damascene, white and double yellow Persian roses, an iris, a mallow, and an elæagnus, for the sake of its sweetly scented flowers and its fruit.

Dr. Aitchison, to whom I again express my acknowledgments, has of course compiled a full and scientific botanical report of his own work, which I presume will be published, and which will necessarily be very interesting, especially to botanists and those peculiarly interested in the subject.

Inhabitants.—The people are agricultural, and their irrigation works show immense labour, but how many generations it has taken to bring them to their present state it is impossible to say. Their manufacturing industry is limited to guns (topak), long-barrelled weapons, very heavy, and bound round with brass, with a stock cut out in a curve; pistols (kesai) and knives (charras) in Khost, Shaluzan, Zeran, and other places; the Khost knives being considered the best. Some of the guns are rifled, and some of the men have old Enfields, the stocks of which they have cut down to the same shape as their own; this preference appears strange, as of course the whole balance of the weapon is spoilt. I noticed that all the better sort of guns were English made, and where not entirely so, the lock generally was; even their flint locks were mostly English, and I have not seen one gun with hammer and nipple that was not marked "Tower."

Their pistols are great, heavy, clumsy things, some handsomely inlaid, having large bell mouths, others being straight in the barrel. I was informed by them that the bell-mouthed one was for use when near an enemy, as they put in three or four balls, and it made a large wound, so the man could not recover, while the straight barrel was for shooting at an enemy when a little distance off. Their knives are about two feet long, about one inch and a half deep at the hilt, and about a third of an inch thick at the back near the hilt. They take a deep edge, are always

kept very sharp, and taper off to a very fine point, which has a little curve upwards. It may be imagined what a terrible gash is given by such a knife. The handles of course (like all Eastern swords and knives) are small, in fact much too small for Europeans to take a good grip of them, and I have not seen a single knife, even among the best of them, without a flaw in the metal. They make baskets of very open work, and also chaplis or grass shoes, the best things to climb hills in when accustomed to them.

The women make a very coarse stuff out of sheep's wool, and make the men's large loose trousers (rog) and their own (jerob), which latter are tighter than the men's below the knee. A shirt (khat) also is made by them of wool or cotton, which hangs down from the neck to the ankles. A loose description of chogha (or choga as English people call it), called sharre, is also made in the villages; it is very coarse.

Tribes—Turis, Jajis, &c.—The Kurram Valley from Thal to the eastern foot of the Paiwar range is inhabited mostly by the Turis; a strong, sturdy people, who like all these hill men are filthy in person. This part of the country originally belonged to the Bangashes, but they have been driven out by the Turis till they have only a few villages such as Shaluzan and Zeran left. The Turis were very dissatisfied with the Durani rule, and have hailed the advent of the British with delight. They are of the Shiah persuasion of Mussulmen, and this did not tend to make them look on the rule of the Durani Government very favourably even had it been good, they being Sunnis. Although reported to be a brave race, they did not appear in very good colours during the attack on the Paiwar Kotal. They, however, have been useful to us in many ways during the campaign in providing carriage, &c. The Turis are divided into sections, the Gundi Khels, Alizai, Hamza Khels, Mastu Khels, and Dapozai.

The Bangashes, who are also Shiahs, inhabit the Miranzai Valley, on the east of the Kurram, and the country round about Kohat.

The next people we come to are those inhabiting the Ariob, and as these are the people who have given us most trouble throughout the war, and are likely to be the cause of most anxiety in the future, I will dwell a little longer on them; the more so as we knew nothing about them previously.

The valley of the Ariob is principally inhabited by the great tribe of Jajis, with a few hamlets belonging to Mangals and wandering Ghilzais, called Ham Shayahs, who have been allowed to settle on small portions of land which the Jajis themselves did not care to cultivate, the latter at first being only tenants, but with the lapse of time acquiring vested rights, and also helping to protect the Jajis from excursions made by the Mangals.

The Jajis are a tribe of some 25,000, the fighting strength being

about 6000. There are twelve sections in the tribe, four of which are not in Ariob and eight are. The four outside the Ariob are:—(1) Jaji Maidan, on the borders of Khost; (2) Jaji Danni, near the former; (3) Jaji Isteah, in the country at the foot of the Isteah River and on the Kurram; (4) Jaji Algarh, in the country about the Drak Algarh Pass. Of these I suppose the Jaji Maidan and Jaji Dannis are not likely to come under our rule. The remaining eight, in the Ariob Valley, are as follows:—(1) The Ada Khels; (2) the Lehwannis, who are considered the bravest of the Jajis and their best swordsmen; they opposed us to the very last in the attacks on the 28th of November and 2nd of December on the Paiwar Kotal; (3) the Ahmed Khels, Bian Khels; (4) the Petla Ali Sangis; (5) the Ali Khels; (6) the Shamu Khels, who are the most powerful, numerous, and wealthy of the Jajis; (7) the Hasn Khels, the poorest and the most dreaded of all the tribe, being the most independent and most daring robbers in the neighbourhood. In fact, no man dared to kill a Hasn Khel, even if he caught him in the act of house-breaking. The Amir used to pay them a regular subsidy to prevent them robbing along certain roads leading into Kurram, Khost, and the Logar. There is a story told of one of our promising new subjects, an old gentleman, who having been paid for some service he had performed, remarked with disgust, "That he could steal more than that in a night!" Lastly, (8) the Ahmed Khels of Kara, the most bigoted in their religion of all the Jajis (living near the Tangi), and also perhaps the most well to do.

Religion, Marriage Customs, &c.—The religion of the Jajis is that of the Sunni sect of Mahomedans, and they are mortal enemies of the Turis. They claim down to the eastern base of the Paiwar Kotal range as their territory. They are supposed to have originally come from Nital, in the district below Hangu, between Thal and Kohat; at least they have retained to this day some customs which are neither Sunni nor Shiah, amongst others the bad practice of buying wives. The betrothal and purchase of wives leads to more bloodshed than any other transaction. When a girl attains the age of seven or eight years, and sometimes earlier, she is betrothed to a lad, who is allowed the entry of the house of the girl's parents, no one else daring to propose to her. She is allowed to grow up in close intimacy with her intended husband until she arrives at the age of puberty, when the man is called on to pay a preposterous sum, varying from 100 rupees even to 400 rupces, before he can marry her, and in case of refusal he is forbidden the house. The result invariably leads to a fight, as in nine cases out of ten the girl simply runs away with her lover, and then her father either murders his would-be son-in-law, or what probably satisfies him as well, some one of his near relations. The other family then seeks revenge, or as they calmly call it, an exchange (badli), and so it continues. If the girl is a very obedient one, and is reluctant to leave

her home or disobey her father, then her lover murders her father and takes her off to his house. A fight from this cause at Karmana, not far from our camp, was kept up all night, from house to house, and three persons were wounded. Marriages are celebrated with a good deal of firing, and dancing with swords, both on the occasion of the bridegroom going to the bride's house and on his bringing her to his own.

The Jajis bury their dead on the nearest hill, and erect kangahs or shrines to the memory of all travellers killed by robbers, whom they raise to sanctity. The women assist in the burial as much as the men, but they mourn for their dead all by themselves in a separate place.

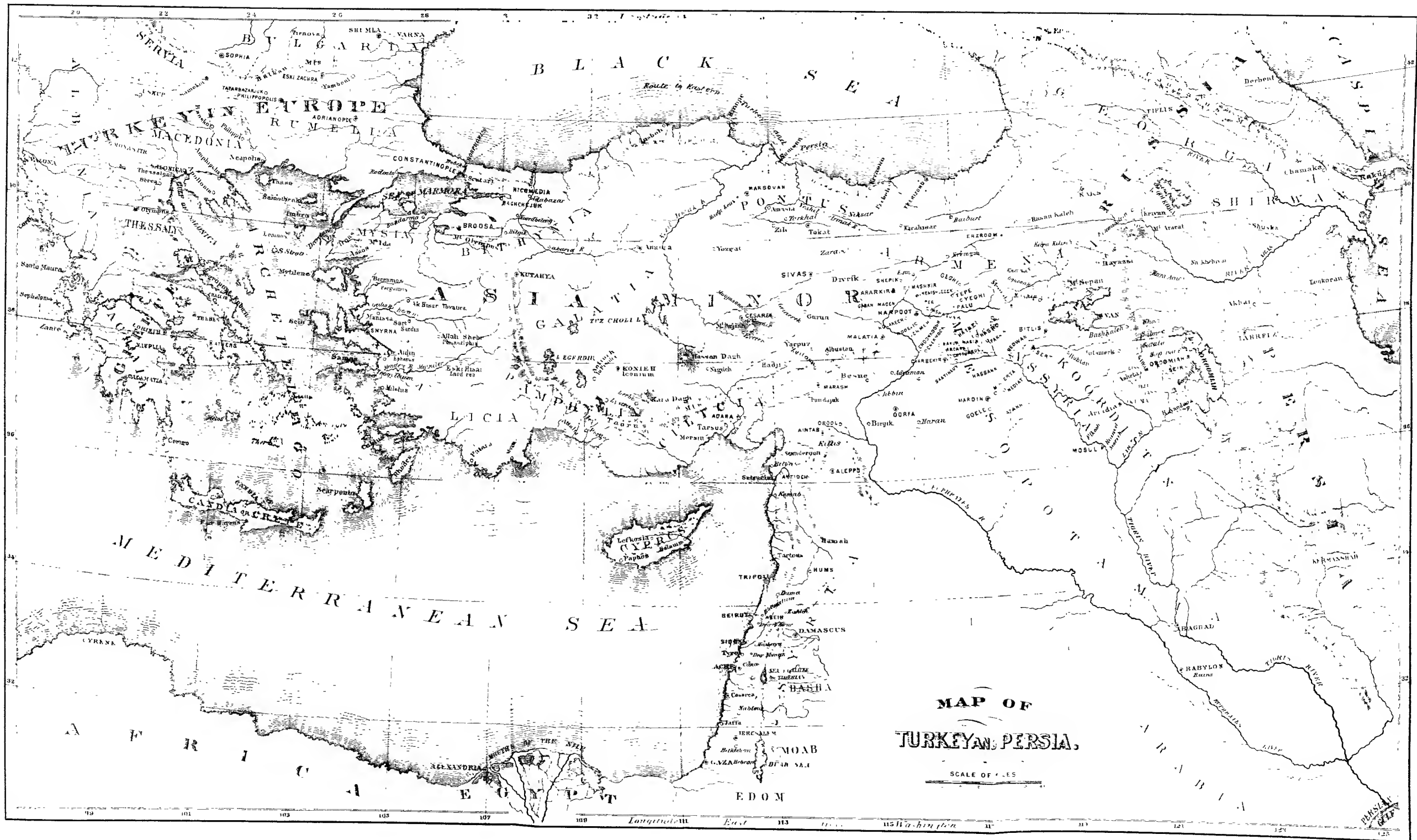
The arrival of a young Jaji into the world is celebrated by a regular fusillade and rejoicing, at whatever period of the twenty-four hours, night or day, the event may take place.

Assessed Revenue.—The assessed revenue was so much per each Jaji section, viz., 680 rupees, except the Hasn Khels who paid 500 rupees, besides kharwars (mule-loads) of 80 maunds each. Out of this, 32,000 rupees were paid to the maliks (headmen of villages), inamdars (men holding gift-lands), and mollahs (priests); and the balance of 35,000 rupees was paid to the Kabul Government, making the total 67,000 rupees. Of the kharwars (mule-loads of grain) there were collected 35 altogether; out of these, 12 kharwars 52 maunds were paid to the maliks, &c., and the remaining 22 kharwars 28 maunds to the Durani Government. All professions and trades were taxed, which naturally extinguished any small spirit of enterprise that might otherwise have existed.

Remaining Tribes.—The remaining tribes who have been directly or indirectly concerned in the campaign, some of whom will be British subjects and others neighbours for the future, are as follows:—On the north and north-west and over the Lakerai are the Azar Khels, Akbar Khels, Safoodeen Khels (sword of religion), and Babar Ghilzais, who have always been independent of the Kabul authority. These Ghilzais, Captain Rennick tells me, are neither marauders nor kooches, and they will probably be very unobtrusive and peaceful neighbours.

To the west and south-west are the great tribe of Ahmedzai Ghilzai, consisting of the Zaman Khels, Amram Khels, Kasim Khels, Machalgu, Tota Khels, and Bago Khel Ghilzais. The three last-named sections of this tribe are to it what the Hasn Khels have been to the Jajis, i.e. robbers by training and profession. These tribes, though nominally independent, are yet somewhat under the influence of Padshah Khan, now Wazir to the present Amir, and who is the head of the great Ghilzai clan, about and west of the Shutar-gardan.

South of the Ariob are the Sohaks or Kohsimwars, or Zurmat Ghilzais. Also south of the Kurram and on its left bank, holding the



country about the Lajhi River, are the Lajhwars, who are Mangals, and these Lajhwars are divided into three clans; the Fattahkekhul, the Agarkhul, and Andazkhul. These Lajhwars are the men who behaved so treacherously, and fired on us when we went to Lajhi.

Again, on the right and left bank of the Kurram, coming next to the Lajhwars, on the east, are the Chakmannis, or Chamkannis, holding the country about Keraia, on the Kurram to Lajhi, to Makhbul Land, and up the Gabara River to the Mangal country. Next the Chakmannis, to the east, are the Makhbuls in the country between Jaji Thana and the Kurram.

All these tribes are independent, but I have no reliable information as to whether any or how many of these will come under British rule. Khost is inhabited by Khostwals who are Sunnis, and whose chief, Akram Khan, gave in his submission to the British at once; they were under the Kabul Government. To the west and north-west of Khost are the Jadrans and Gabar Mangals, both independent. South of Khost and Kurram is a powerful tribe, the Waziris, who are divided into the following clans: Luli, Mahsud Waziris, Gurbuz Waziris, Ahmedzais and Utinanzais.

The Mangals are scattered all over the country, and there are many divisions of them. They are robbers and ruffians generally. There are Mangal villages near the Mangior and in Khost, and even to the east of the Paiwar. Some are found also on the north side of the Lakerai Kotal in the Surkab Valley, and in fact wherever they can get a piece of land. Whatever portion of this robber tribe may come under our rule, it is to be hoped they will learn that there is a difference between "meum and tuum."

The dress of all these hill men consists of a large, loose pair of trousers (partuk), a loose sort of coat, called a khat, a turban or puggree (usually dark blue), called rumeal, a long shawl or scarf about the body, usually dark blue, and then called a "lungi," and sometimes a white sort of scarf called a "tekrai." When the weather is cold they wear the coarse chogha I mentioned before, and some wear poshteens made of sheepskins. When it is wet the hair is worn outside, at other times the leather side (sometimes very well worked) is outside. They all walk about armed with a gun or rifle, a knife, and two pistols.

The women wear trousers and a jacket, and a long shawl, generally all blue with a little red here and there, with which they cover up their bodices and faces, no matter how old or hideous they may be. I have never seen any *young* women; there have been some fearful hags sometimes outside the villages, but that is all.

While at Keraia the Chakmannis gave us an evening entertainment of dancing and singing. In their war dance there were an inner ring of young men dancing round the fire and an outer ring, outside of which

again men were running as fast as they could go. They all brandished knives at the imminent risk of cutting off one another's heads; but the dance was neither interesting nor picturesque.

They showed us, however, a marriage dance, which was better. There was an inner and an outer ring made round the fire. The inner was composed of men with long hair, who at a distance looked almost like women. When I asked who they were, I was informed they were young men who wore their hair long because the ladies liked it; but, being amused at this reply, I remarked they were not all young, to which I got the curious reply, that nevertheless the ladies were very fond of those men. Those with long hair moved round the fire at a somewhat slower pace than the outer ring, keeping time with the tom-tom which, of course, was being beaten. They did not seem to sing much, being apparently more intent on making their long hair swing about in time to the tune. This they did by leaning forwards towards the fire, and swaying their heads about from right to left, backwards and forwards, and round and round, with such energy that their wiry hair moved about, keeping quite straight out on end, without a wave in it, by the force of the motion. I don't know if they suffered from headaches the next morning, but they certainly *ought* to have felt very ill. The outer ring was composed of males of all ages, from young children to toothless old men, and these in the meantime went through a most quaint dance.

This outer circle was divided into three parts (three arcs as it were), those composing one of the portions singing together some words, which seemed to proceed from their nasal organs, all the rest then joining in a chorus, that sounded as if it came from the bottom of their throats, and appeared to be something like "Ach ah—Ah oh—Wuh ah—Wuh ho." At the same time they all clapped their hands and bowed to the fire, turned round to the right, raising their hands over their heads, turned back again, and clapped their hands again; then turned to the left and back again, and bowed to the fire and clapped their hands again; this they did several times, and then the next portion of the circle sang a verse followed by the chorus again, and so on. Their feet also did a step, a most decided step, something between a Highland fling and a Christy minstrel breakdown. All the time they were also gradually moving round the fire. The tom-tom was beaten, and as it grew louder and quicker, so did the song and dance go louder and quicker (the men's heads in the middle also moving more rapidly), until at last they got very excited, made a great noise, and looked very wild. There were clear indications of an air in this song, and certainly most marked time. With their picturesque dresses, quaint faces, and wild gesticulations (all made more grotesque and savage by the fire-light), it formed a most curious and interesting scene.

After these dances they began some solos, quartetts, &c., but these

were too dreadful. A boy screeched as if he wished to break a blood-vessel, and not being able to stand this part of the performance, I retired to my tent and fell asleep.

Conclusion.—Of all the tribes that will come under our rule none will be of so much importance to us as the Jajis, and none will probably feel the change more; but I think they already begin to perceive that the advent of the British has been a godsend to them. Before then they had been driven nearly wild by the heavy taxations of the late Amir Shere Ali. They had also suffered much from the floods in the spring of last year which carried away nearly 15 per cent. of their cultivated lands. These floods were very severe, and for more than four months there was over 7 feet of ice in the Ariob Valley. In February and March there was as much as 3 feet of snow. But the Jajis are now flocking back to their villages; even those who had gone as far as the borders of Kafirstan are returning to their ruined homes, and the waste lands are being brought under cultivation with great vigour. This they are doing in spite of the numerous other occupations the British provide them with, and which they seem fully to appreciate. They are apparently beginning already to see that peace and security have made them richer than they were; and that the money thrown into their hands for transport, grass, timber, road-making, &c., means the power to reclaim from the river the lands they have lost.

I have endeavoured to be as brief as possible, but I am afraid this paper will be thought too long. A new country is always interesting, and one is so afraid of leaving out anything which, apparently trifling, may be of importance, that the description grows to greater length than was at first anticipated. So I conclude with the hope that the example of willingness to be a peace-loving folk, at present set by the Jajis, may be followed by the other tribes in turn, and that this behaviour is not the lull before the storm, with the secret design, after their crops are collected and stored, to begin their reckless ways again, but is a firm determination to become an orderly and contented race. They will require, of course, placed over them a man of strong will and great courage who will rule them kindly, but firmly; a man whom they will feel they can trust as one who will never deceive them, but who is as quick to punish as he is quick to give assistance and reward. If such a man is put to rule them, and they are in earnest themselves, there seems every prospect of a bright future in store for these newly-made subjects of Her Most Gracious Majesty the Queen and Empress of India.

*History and Present Condition of our Geographical Knowledge of
Madagascar.* By the Rev. JAMES SIBREE, junior.

Map, p. 688.

History.—Although only seen by Europeans within the last 380 years, the great African island of Madagascar has been known to the Arabs for many centuries, probably for at least a thousand years past; and also, but perhaps not for so long a time, to the Indian traders of Cutch and Bombay.* The former, indeed, have left ineffaceable traces of their influence in the words they introduced into the Malagasy language, principally in the names of the days and months, and in those connected with divination and astrology; and also in the various superstitions they engrafted upon the original religious belief and charm-worship of the inhabitants.†

But even before the Arabian intercourse, it seems probable that the Phœnician traders, in some of those long voyages made by “the ships of Tarshish” (1 Kings x. 22), touched at Madagascar, or at least obtained information about the island. For it is mentioned by some of the classical writers under various names: thus, Ptolemy in his ‘*Tabulæ*’ appears to refer to it under the name of *Menuthias*; ‡ and Pliny writes about an island which, in the opinion of many authors, could hardly be any other than Madagascar, under the name of *Cerne*. § And it has been supposed to be obscurely indicated in the book ‘*De Mundo*,’ ascribed to Aristotle, under the name of *Phanbalon* || (or Phebol).

Some other names are also given to Madagascar by early writers: thus, in a quaint old book published in 1609 by Hieronymus Megiserus, entitled ‘*Beschreibung der Mechtigen und Weitberhümbten Insul Madagascar*’ (Altenbourg in Meissen), it is stated that Arrian calls it *Menutheseas*, Stephanus Byzantinus, *Menuthis*, and Diodorus Siculus, *Iamboli*. Tharetus is also quoted as saying that it was called *Pacras*, on account of the many tortoises found there; afterwards *Albargra*, then *Manutia-Alphil*, and then *Magadascar*, a corruption of the name of Magadoxo, on the mainland of Africa, whose king is said to have invaded the island. Finally, this word was changed to *Madagascar*. So runs the

* See Sir Bartle Frere’s despatches in Blue Book on the East African Slave Trade.

† See Rev. L. Dahle in the ‘*Antananarivo Annual*,’ No. ii., pp. 75–91.

‡ “*Huic se processo promontorio hodie Mosambique adjacet ab æstivo ortu Insula nomine Menuthias; cujus positio 85 Austral. 12° 0’*” (lib. iv. cap. 9).

§ “*Contra Sinum Persicum Cerne nominetur Insula adversa Æthiopiæ, cujus neque magnitudo, neque intervallum a continente constat, Æthiopas tantum populos habere traditur*” (lib. vi. cap. 31). The bishop appointed to Madagascar four years ago has adopted this name “*Cerne*” as that of his see on his official seal.

|| “*Quæis tamen ipsis magnitudine nec Tabrobane cedit, nec ea cui Phebol nomen est, hæc ad Arabicum Sinum.*”—‘*De Mundo; Ad Alexandrum*,’ 393, 21.

account, some of the particulars of which are probably not very reliable, although they may possess a basis of fact.*

Madagascar is mentioned by several of the Arabian writers, being known to them also by various names: as *Serandah* and *Chebona*; and by the geographers Edrisi and Abulfeda (twelfth and thirteenth centuries) under the strangely different titles of *Phelon* (or Phenbalon), *Quambalon* (or Chambalon), *Zaledz* (also variously spelt), and *Gezirat-al-Komr* (or Island of the Moon).

The country was first made known to (modern) European nations by the celebrated Venetian traveller Marco Polo, in the thirteenth century. He, however, did not himself visit the island, but heard various accounts of it during his travels in Asia, under the name of *Magaster* or *Madeigascar*. A chapter in his book of travels (33, bk. iii., Yule's ed., pp. 345-354) is devoted to a description of it; but much of what he relates is evidently confused with accounts of Zanzibar and countries on the mainland of Africa, as he says that ivory is one of the chief productions, and that elephants, giraffes, and other animals (which never existed in the island), were numerous. His well-known account of the *ruk* or gigantic bird, long thought to be entirely fabulous, has during the last few years been discovered to have a basis of fact in the existence of the now-extinct *Æpyornis*, a struthious bird allied to the New Zealand Moa, and which produced the largest of all known eggs.

It was not until the commencement of the sixteenth century that Europeans set foot upon the great island. Towards the end of the previous century the adventurous Portuguese navigators, Bartholomew Diaz and Vasco de Gama reached the southernmost portions of Africa and rounded the Cape of Good Hope, thus discovering the sea route to India and the further East. On the Mozambique coast they found numbers of Arabs trading with India and well acquainted with Madagascar. But in 1505 King Manoel of Portugal sent out a great expedition of twenty-two ships to the Indies, under the command of Don Francisco de Almeida, the first viceroy, with orders to build fortresses at Sofala and Quiloa for the protection of the Portuguese commerce in Africa. Juan de Nova, whose name is preserved in that of a small island in the Mozambique Channel, sailed in this expedition. Almeida sent back in the beginning of the following year eight ships loaded with spices to Portugal, under the command of Fernando Soares. On their way they discovered on the

* Since writing the above I have referred to the original texts of some of the classical authors referred to by the old German writer, as well as to his own book; and also to a learned French author, Gossellin, who, in his work entitled 'Recherches sur la Géographie Systématique et Positive des Anciens' (4 vols., Paris, 1813), disputes the opinion of earlier writers that Madagascar was mentioned by classical authors under the names of Cerne and Menuthias (tom. i. pp. 80, 191-193). With regard to the former of these names, I think his opinion is correct, but I am not so sure about the second. Gossellin maintains that Menuthias was the name of a very small island in the estuary of one of the great rivers on the East African coast.

first of February, 1506, the east coast of Madagascar.* From this it appears clear that Soares, and not Almeida, as commonly said in histories, was the real discoverer of the island.

In that same year João Gomez d'Abreu discovered the west coast of Madagascar on the 10th of August, St. Lawrence's day, from which circumstance, following the usual custom of the early Spanish and Portuguese navigators, the island received the name of San Lourenço, which it retained for more than a hundred years. He gave the name of Bahia Formosa to the bay which he first entered, apparently the bay between Point Barrow and Point Croker on the south-west coast. The famous navigator, Tristan da Cunha, who was sent out to India in the same year, also heard of the island through one of his captains, Rodrigo Pereira Coutinho. This officer had been obliged to take refuge in one of the southern ports of Madagascar from a storm which scattered Da Cunha's squadron off the Cape of Good Hope. Hearing glowing accounts of the newly-found country from his subordinate, Da Cunha visited various parts of the same coast, making with his own hand a chart of what he discovered, and was accordingly, though of course mistakenly, celebrated in song by his countryman Camões in the *Lusiad* (c. x., s. 39), as the discoverer of Madagascar:—

“Green Madagascar's flowery dale shall swell
His echoed fame, till ocean's southmost bound
O'er isles and shores unknown his fame resound.”†

He reached the northern end of the island on Christmas Day, and accordingly gave it the name of Cape Natal, a name which, however, it has not retained, but has been for long known as Cape Amber, or Ambro.

The ship of Gomez d'Abreu doubled the northern cape, and running along the east coast reached the mouth of the River Matitânana on the south-east, where he landed. In a letter dated Mozambique, 8th February, 1507, to King Manoel, from the celebrated Afonso d'Albuquerque, who was with Da Cunha's expedition, he speaks of the discovery of the island; so that within a short time several of the most intrepid Portuguese navigators discovered various portions of the Madagascar coast while on their voyages to or from the far east—in fact they seem to have almost, if not quite, circumnavigated the island.

During the early times of the French intercourse with Madagascar

* See ‘The Life of Prince Henry of Portugal, surnamed The Navigator,’ Major's ed., London, 1868, p. 415.

† Mickle's translation of the *Lusiad*. See Lyons McLeod, ‘Madagascar and its People,’ p. 6. The original Portuguese runs thus:—

“Pelo CUNHA também, que nunca extinto
Será seu nome em todo o mar que lava
As Ilhas do Austro, e praias, que se chamam
De SÃO LOURENÇO, e em todo o Sul se afiam.”

(reign of Henri IV.), they called it by the name of *Ile Dauphiné*, but this appellation was never accepted by other nations.

A few words may here be said about the name by which the island has been known for the last 200 years.

There is much reason to believe that *Madagascar* is not a native name, but one given to the country by foreigners, and has only in modern times been accepted by the inhabitants. The spelling of the word in its present form is opposed to the laws of the native orthography, which does not allow the joining of two such consonants as *s* and *c* (*c*, moreover, is not used), and all native words end in a vowel. *Nosin-dambo* or "Isle of wild hogs," was a name occasionally given to it, but when the Malagasy speak of the whole of the island they usually call it *Izao reheitra izao*, "This all," or *Izao tontolo izao*, "This whole," thinking, like many insular people, that their own country was the most important part of the world, and that the Arabs and other foreigners who visited the north-west coast, came from some insignificant islands across the sea. Another term, somewhat poetical in form, and occasionally used by the people, is *Ny anivon' ny riaka*, i. e. "The (land) in the midst of the moving waters," a term which might be used of any island, but is only applied to Madagascar itself, *ndasy* being the word employed to denote the smaller islands off the mainland. This term was engraved on the huge silver coffin of the first Radama, who was there called *Tòmpon' ny anivon' ny riaka*, "Lord of the island," as above described. The form of the word,* like the name of the inhabitants of the country, Malagasy (also probably not a native one), seems to indicate an African origin, so that possibly there may be some foundation of truth in the accounts given by the German writer already quoted from. *Ma*, it is well known, is the usual prefix to words indicating tribal names on the African continent, as *Makololo*, *Matabele*, &c.

The early accounts given of Madagascar by voyagers and other writers are full of glowing and extravagant praises of its fertility and natural wealth. But in all this, of course, it formed no exception to other newly-found countries, for the imagination of people of the sixteenth and seventeenth centuries invested with a halo of beauty and mystery all the strange new lands which were being yearly discovered by the bold seamen of Portugal and Spain, and of England and Holland. The luxuriance of the tropical vegetation of the New World and the far Eastern Archipelago, and the undoubted wealth in precious metals of some of those regions, made every fresh addition to their geography a possible El-Dorado, with gold and gems waiting to be collected in every stream, and precious spices to be gathered from every tree. The very

* In Copland and other writers the island is called *Madecassa*, which, by substituting *k* for *c*, would be a correct enough native word. In many books the people are called *Madecasse*, but the origin of these forms of the name is obscure.

title-pages of some of the early books upon Madagascar are an eloquent panegyric on the resources and wealth of the island; while their quaint descriptions, as well as the strong religious feeling so many of them evince, make them by no means uninteresting reading.

Although the Portuguese discovered the island they made no lengthened occupation of any part of it. Probably they found that their extensive possessions in South America and Africa, and the Malay Archipelago, demanded all their strength to occupy; and so their colony was soon abandoned. For a few years, towards the close of the sixteenth century (1595-98), the Dutch had some little intercourse with Madagascar, but were not much impressed in its favour, for they lost through sickness so many of their number that an island where they landed was called "The Dutchmen's Graveyard." A book written by Johan Hugon von Lindschot (1628) describes these voyages; and it is evident that the Dutch paid some considerable attention to the country, for two of the very earliest books upon Madagascar were published at Amsterdam in 1603, both of them giving vocabularies of Malagasy words.*

As the Portuguese discovered Madagascar, probably the earliest descriptions of the country are to be found in Portuguese books, notably in the '*Commentarios do grande Afonso d'Albuquerque*' (Lisbon, 1576, fol.), but I find there is little of interest in this work.

Next in date come the two Dutch linguistic works already mentioned, and then the little German work of Megiserus, from which quotations have been made as to the early names of the island. The title-page of this book (translated into English) promises to give us:—"A genuine, thorough, and ample as well as historical and chronological description of the exceedingly rich, powerful and famous ISLAND OF MADAGASCAR, called also ST. LAWRENCE; together with an account of all its qualities, peculiarities, inhabitants, animals, fruits and vegetables; also a history of what has happened there before and since its discovery."

The title-page, like those of other books we shall have occasion to mention, leads one therefore to expect much valuable information. But except particulars about the names given to the island at that period, there is little of value to be learnt about either country or people, while some of the same mistakes are made as to the productions as are found in Marco Polo's account. At the end is added "A Dictionary and Dialogues of the Madagascar Language, collected with special industry from the Portuguese, Italian, and Latin Histories and Geographies;" and this portion, more than half of the book, has considerable interest, the greater part of the words being easily recognisable. It has a small map, and seven or eight engravings of the people and of the animal and vegetable productions.

* See '*Antanànarivo Annual*,' No. ii. p. 123.

The earliest English book upon Madagascar of which I have any knowledge is by one Walter Hamond, surgeon, and published in 1640, entitled, 'A Paradox: Proving the Inhabitants of the Island, called Madagascar, or St. Lawrence (in Things temporal,) to be the happiest People in the World.'* This work may be almost regarded as a satire upon the extravagance and luxury of the times, for its general purport is to prove that the inhabitants of Madagascar in their poverty and ignorance are much better off than civilised peoples, being not much troubled with clothing or ornaments, or with the fatigues of commerce, navigation, and civilisation, the varieties of food and drink, and the evils arising from the use of gunpowder and the arms of European nations. All this is argued out in a comically serious style. Possibly a diligent search in the larger libraries would discover earlier books, or at least pamphlets or tracts on Madagascar, and doubtless there are many notices of the country to be found in the narratives of the early English voyagers.

The same author published three years later another book, whose title-page is curious from its quaintness and as showing the great expectations formed of the island. It is as follows:—

"MADAGASCAR, the richest and most frivitefvll island in the world. Wherein the temperature of the clymate, the nature of the inhabitants, the commodities of the countrie, and the facility and benefit of a plantation by our people there are compendiously and trucly described. Dedicated to the Honourable Iohn Bond, Governour of the island, whose proceeding is authorized for this expedition, both by the King and Parliament. By WALTER HAMOND. London: printed for Nicholas Bourne, and are to bee sold at his Shop, at the South Entrance of the Royall Exchange. 1643."

The promise of the title-page (as in the case of the German book already described) is hardly borne out by the book itself, which does not contain much of value except some information about the author's experiences with the people, chiefly those about St. Augustine's Bay on the south-west coast. He seems to have been greatly impressed by the honesty and good faith of the inhabitants; again and again is this mentioned in such words as "in all our trayding with them we never sustained so much as the losse of one bead." He even says, "they retaine the first incorrupt innocence of man," and are "a people approaching in some degree neere Adam, naked without guilt, and innocent, not by a fore't vertue, but by ignorance of evill, and the creatures as innocent and serviceable to man as they were before his transgression." (How wofully, according to all accounts, must they have depreciated since then!) We find, however, in the book that among these innocent people wars were going on between them and the neighbouring tribes,

* Reprinted in 'The Harleian Miscellany, a Collection of Scarce, Curious, and Entertaining Pamphlets and Tracts as well in Manuscript as in Print.' London, 1808.

as there still are, and probably always have been. There is a notice of some of the valuable trees of the country, ebony, tamarind, and others, and of a remarkable tree he calls the "flesh-tree," probably a dragon-tree, yielding a sanguine-coloured sap. The book contains an urgent appeal to his countrymen to "go in and possess the land," which "doth here by me friendly and lovingly invite our Natione to take some compassion of her nakednesse, her poverty and her simplicity, both corporall and spirituall, and doth earnestly and affectionately even beg of us to redeeme her out of her miserable thraldome under the tyranny of Satan [curiously inconsistent this with the previous eulogy of the people], to be united with us into the fellowship of the sons of God by our union in Christ Jesus." Who this Hon. John Bond, "Governour and Captaine-Generall of Madagascar," was I have been unable to discover, or to find what claim he had to such large powers in the great island.

In the same decade of the seventeenth century, other books on Madagascar were also published, the next in date being one with an extremely long title, which is also perhaps worth quoting nearly in full, not only for its quaint language, but as affording additional evidence of the sanguine expectations formed respecting the island. It runs thus:—

"A briefe Discovery or Description of the most famous island of MADAGASCAR or ST. LAWRENCE in Asia neere unto East India. With relation of the Healthfulness, Pleasure, Fertility and Wealth of that Country, comparable, if not transcending all the Easterne parts of the World, a very Earthly Paradise; a most fitting and desirable place to settle an English Colony and Plantation there rather than in any other parts of the knowne World. Also the condition of the Natives, there inhabiting, their Affability, Habit, Weapons and Manner of living, the plenty, and cheapnesse of Food, Flesh, Fish; and Fowle, Oringes, and Lemonds, Amber-Greece, Gold, Turtle-Shells, and Drugs and many other Commodities fit for trade and commerce, to be had and gotten there at cheaper Rates than in India or else-where. Also trading from port to port all India and Asia over, and the great profit gained thereby; the chieftest place in the World to enrich men by Trade, to and from India, Persia, Moco, Achine, China and other rich Easterne Kingdoms. It being the fittest place for a Magazinc or Store-house of Trade between Europe and Asia, farre exceeding all other plantations in America or else-where. Also the excellent meanes and accommodation to fit the planters there with all needfull and superfluous for back and belly (out of India neere adjacent, at one fourth of the price and cheaper than it will cost in England; yea, Fat Bullocks, Sheep, Goats, Swine, Poultry, Rice, (and Wheat and Barley reasonable, etc.) exceeding cheape, for the value of 12 pence or one shilling English, will purchase or buy of the Natives as much as 5, 6, 7 pounds or more in England, in this famous Island at their first arrival, which no other country hath afforded. By

RICHARD BOOTHBY, Merchant. London: Printed by E. G. for John Hardesty at the Signe of the Black-spread Eagle in Duck-Lane, 1664."

It seems from the preface to Boothby's work, which is a small octavo of seventy-two pages, that two years previous to the publication of this book there had been a project to found an English plantation in Madagascar, Prince Rupert having been named at the Privy Council board as Viceroy for King Charles I., from whom he was to have had twelve men-of-war and thirty merchantmen to form the colony. The Governor and Committee of the East India Company were also ordered to give all possible assistance to the enterprise. Rupert, however, going away to the Continent, the Earl of Arundel, Earl-Marshal of England, was appointed; and it appears that that nobleman had also written a book on the subject, urging the desirability of forming a magazine or victualling station on the island. However, the calling of the parliament immediately preceding the Long Parliament, and the political troubles which soon ensued, put a stop to this projected English colony in Madagascar. It is stated in Boothby's book that the island had been previously visited by other distinguished Englishmen, viz. the ambassadors from Charles I. to the King of Persia, who landed at Madagascar on their way to the East.

The appointment of Prince Rupert called forth another book upon the island, but this time in the shape of a poem, by Sir William Davenant, entitled 'Madagascar, with other Poems, by W. Davenant, Knight' (London, 1648). This production occupies only twenty-one pages of print, and gives no information about Madagascar itself, being simply a complimentary effusion, "written to the most illustrious Prince Rupert." Following the strange conceits common to the literary productions of the time, such as are seen in Beaumont and Fletcher, Donne, Herbert, and other writers, the poem is in the form of a dream, in which the country where the Prince was going is described in an inflated style, with extravagant laudation of his patron, so that even the sun is described to be wholly absorbed in what Rupert is supposed to have conquered:—

... "The good old Planet's business is
Of late, only to visit what is his;"

while as to the government of the Prince,

"Chronologers pronounce his style
The first true monarch of the golden isle;
An isle so seated for predominance
Where naval strength its power can so advance."

The supposed riches of the country are next described, the colonists employing themselves

"In virgin mines, where shining gold they spy,
Some root up coral-trees where mermaids lie
Sighing beneath those precious boughs, and die."

Some from "old oysters" rifle pearls,

"Whose ponderous size sinks weaker divers.
Their weight would yoke a tender lady's neck.
Some search the rocks, till each have found
A saphyr, ruby, and a diamond."

The poem is a poor enough production in itself, but has a certain interest as showing the extravagant notions then entertained about the wealth of distant countries. But it nevertheless met with great commendation from the poet's contemporaries, Endymion Porter saying that it was a

. "poem in so sweet a style
As yet was never lauded in this isle."

Another of the poet's friends, Sir John Suckling, Comptroller of the Household to King Charles I., wrote a sonnet, entitled "To my friend Will Davenant, on his Poem of Madagascar." The fifth decade of the seventeenth century was thus, it appears, most prolific in works upon the great African island.

Towards the end of the century an account was written (but not published until some years later) of the adventures and extreme hardships suffered by an English sailor upon a small island off the western coast of Madagascar. This was entitled "A Relation of three Years' Sufferings of Robert Everard upon the Island of Assada, near Madagascar, in a voyage to India, in the year 1686, And of his wonderful preservation and deliverance and arrival at London, Anno 1693." * This account, which occupies twenty-three pages of small folio print, contains several interesting particulars of the customs of the people, among which is the statement that on one occasion twenty children were circumcised by the *women*. The writer had evidently a hard time during his three years' residence; for although he made shot for the king, because he could not also find gun-flints he was turned out of doors and left to shift for himself. He obtained food in the shape of fruit and roots, shell-fish and turtles, but he had to lodge under a tree only, for two years and nine months, although on one occasion he says it rained continuously for *three months*. As he was quite naked he kept a fire burning for warmth, not being allowed to enter the houses. Eventually he became (no wonder) very ill, and at his request was bought by an Arab, and at last taken to India, where he obtained his liberty. This island of "Assada" is probably one of those numerous ones off the north-west coast of Madagascar.

The last of these early books which can be here noticed is that by Robert Drury, an English lad who, at the commencement of the last century, went as a passenger to the East on board an Indiaman named the *Degrave*. On their homeward voyage the vessel was wrecked on the south-

* Pages 259-282 of 'A Collection of Voyages and Travels, some now first printed from the Original Manuscripts, etc.' London: Churchill, 1732.

west coast of Madagascar, and owing to imprudent conduct and collisions with the natives, the whole of the ship's company and passengers were eventually killed, with the exception of Drury and another lad, whose lives were spared. He thus became a slave, and remained as such in the island for fifteen years (1702-1717), meeting with varied experience and many hardships, and occasionally being harshly treated, and narrowly escaping being killed. At last, however, he obtained his liberty and returned to England, afterwards writing the book describing his adventures, or, possibly, had it written from his dictation. Drury being comparatively uneducated, the narrative is in a most artless style, with an evident impress of truth, and from its undoubted genuineness is a very valuable record of the customs of some of the Malagasy tribes at that period, and throws important light upon many questions connected with their customs, superstitions, and beliefs. He describes their ancient and patriarchal system of worship in connection with the *ôdy* or household gods; and we see the political state of that part of the island, really unaltered to the present time, in which the different tribes were constantly engaged in warfare, making raids on each other's cattle and capturing slaves. There is added to the book a pretty full vocabulary, which is one of the most valuable portions of it, the great majority of the words being easily recognisable as identical with those in the Hova dialect: and thus giving another proof of the substantial unity of the language over portions of the island far distant from one another. Curiously enough, he gives a decidedly "cockney" pronunciation and spelling to his list of Malagasy words: thus, *hena* (meat) he calls "henar"; *vôla* (money), "vôler"; and *andro* (day), "hawndro," &c.

From the year 1651, when a work describing a voyage to Madagascar by one François Cauche, of Rouen, was issued, a considerable number of books upon the island have been published in the French language. A list of between thirty and forty of these is given by M. Barbier du Bocage in a book entitled 'Madagascar: Possession française depuis 1642,' the title of which work explains the interest taken in the island by the French. But it is quite an unfounded assumption to call Madagascar a French possession, and is warranted neither by conquest or treaty, or by any other claim or right; and although it is quite true that the French have for two centuries past been attempting to gain power in the country, their colonies, or rather, military posts, have never been permanent, nor have they been able to maintain their hold upon any portion of the mainland. They have, however, seized the small island of St. Marie's, off the eastern coast, and they have also possession of the island of Nôsisibé, on the north-west coast; this latter was ceded to them in 1840 by the Sakalava inhabitants of that portion of Madagascar.

Maps of Madagascar.—Turning now to the maps and our present knowledge of the geography of the island, it may be affirmed that a considerable portion of the country is still a *terra incognita* to us; and

notwithstanding all that has been done of late years to increase our knowledge of it, there are extensive regions still unknown and unexplored. Among these may be mentioned the greater part of the triangle formed by the northern portion of the island, from Antsihànaka to the apex of the triangle; almost all the Sàkalàva country on the western seaboard; large portions of the eastern side, from the central plateau to the sea; and lastly, an extensive district to the south of the Bétсилéo province, from the Bàra country to the southern Cape of St. Mary.

The earliest map of Madagascar which I have discovered is one in the British Museum, and is an extremely curious specimen of chartography. The outline of the island there given is so different from the reality, that it would hardly be recognised but for the name, "St. Lorenzo," which is marked upon it. The towns shown on the map, six in number, are true mediæval strongholds, with walls and gates, and crowded with spires and towers, one of them boasting of a grand cathedral! while they are all on such a scale that they would be disproportionately large even if the island were only five or six miles wide. Similarly gigantic ships, with banks of oars, are depicted along the coast, and strange sea-monsters are here and there seen emerging from the waves around the island. From its very incorrect outline I am strongly inclined to think that it is of considerably earlier date than that given in the catalogue, viz. 1570* (Venice); the more so as another map, also Venetian, and dated three years earlier (1567), is far more correct in outline, and the principal capes, bays, and rivers can be recognised, and are tolerably accurate as far as regards the coast-line.

Another very curious old map, on a small scale, is given in the quaint German work of Megiser's already referred to. But I also find that it is taken from an earlier book, a neat little atlas of maps, with descriptions of the different countries, entitled 'Thresor de Chartes,' and dated 1602.

A glance at several of the numerous maps of Madagascar that have been published since these dates, would lead one to suppose that what is stated above as to the incompleteness of our knowledge of the country was all a mistake. On many of these the so-called provinces are defined with a minuteness resembling that of the divisions of the counties on an Ordnance map of England; the various rivers with all their tributaries are all unhesitatingly laid down, and mountain chains of singular regularity and wall-like straightness cross the country in all directions. Far from imitating the ingenuous confessions of ignorance shown on some maps, where

"Geographers, on pathless downs,
Put elephants instead of towns,"

* I am confirmed in this opinion by a further reference to the catalogue, in which a note of interrogation is affixed both to the date and the place of publishing.

many of these early maps of Madagascar are, strange to say, the most minute and exact in their fulness of detail; and knowing how little certainly was then ascertained as to the interior of the island, we look at them with a feeling of astonishment as to whence their information could have been derived.

One of the most curious of these early maps is that prefixed to an English edition of the Abbé Rochon's book entitled 'A Voyage to Madagascar and the East Indies' (London, 1793). According to this map, no part of the country would appear to have been unknown to the map-maker; the rivers with their tributaries have a picturesque symmetry resembling that of stately trees, and the mountains a regular cone-like outline only possessed by mountains seen on a map. But on examining the map more minutely to find out well-known places in the interior, we are puzzled to find that neither the central and most important province of Imérina, nor the capital city of Antanànarivo, are shown; and it is the same with the important province of Betsiléo and its chief towns; while some other places are strangely transposed on the map. Clearly this map owes more of its filling-in to a lively imagination than to any exploration of the country, notwithstanding the somewhat ambiguous assurance in its title that it is "from the original design, drawn on the spot;" but where and what "the spot" was is not specified.*

Again, take a very pretentious-looking map published by Arrow-smith, London, and purporting to be 'Madagascar, from Original Drawings, Sketches, and Oral Information; by J. A. Lloyd, F.R.S., &c., &c., Surveyor-General of the Mauritius.' The last edition I have seen is dated 1850. In a journey to the south-east part of Madagascar in 1876 I consulted this map on many occasions, but found that not the slightest reliance was to be placed upon it. But on returning home, and meeting with a pamphlet containing a paper read by Colonel Lloyd before the Royal Geographical Society on 'Madagascar' (December 10th, 1849), I discovered a clue to all this, for at page 22, in a few remarks upon the map accompanying his paper (a reduced copy of the above map), Colonel Lloyd makes this ingenuous admission: "For the detail of the interior I cannot claim the slightest pretensions to correctness. It is only an attempt to form approximately some foundation for future inquiries, and more correct and extensive research." And yet this map, confessedly so problematical, appears to have been the source of most subsequent maps of the island as given in English books or published separately!

The coast-line of Madagascar, with a narrow strip of country bordering the sea, was accurately surveyed by Captain W. F. W. Owen, R.N., of H.M. ships *Leven* and *Barracouta*, about forty-seven years ago. This

* Since writing the above, I find that Rochon's map is, in its main features, little more than a copy of that given in Flacourt's 'Histoire de la grande Isle de Madagascar,' published in 1661, a hundred and thirty years before Rochon's book.

survey was published by the Admiralty, and Captain Owen described his experiences in a book entitled 'Narrative of Voyages to Explore the Shores of Africa, Arabia, and Madagascar, &c.' (London, 1833).

With regard to the later French maps of Madagascar, they also appear to have been chiefly constructed from verbal information, with an occasional itinerary of a priest, or naturalist, or trader; for the interior detail of most of them prior to 1870 seems little more reliable than that given in the English maps. (The island has been crossed in various directions by a good many travellers, as shown in a valuable list of routes compiled by M. Grandidier, and given in a paper published in the 'Bulletin de la Société de Géographie' (Avril, 1872, pp. 408-411); but very few of these travellers have left any accurate observations or scientific surveys of the line of country they traversed.) How some of these French maps have been constructed is amusingly described by M. Grandidier, in a previous paper upon the island, before the Paris Geographical Society. Speaking of a book by a Mons. Leguevel de Lacombe, entitled 'Voyage à Madagascar,' he says: "This writer relates that he has at different periods traversed the island from north to south, from east to west; he gives the most precise details of his journeys. M. de Lacombe has told me, and I am myself well assured of it, with his book in my hand, that he has never left the east coast! It is from his imagination that he has drawn the accounts to which geographers have attached so much importance that the maps of Madagascar have to the present day been constructed upon the topographical data taken from his work."*

To a French traveller, however, we owe the most accurate general map of the island yet produced. M. Alfred Grandidier, who explored the country from 1865 to 1870, published in 1871 a sketch-map of Madagascar ('Esquisse d'une Carte de l'Île de Madagascar'). It is somewhat roughly lithographed, and was merely intended to illustrate the brief summary of his travels and explorations read before the Paris Geographical Society; but from the prospectus of his magnificent work on the island and its natural history, botany, ethnology, &c., now in process of publication, in twenty-eight quarto volumes,† a very much more elaborate and minute map of the country may be expected.

Meanwhile, this preliminary map has already done much to clear away some traditional mistakes, and to establish two or three facts of great interest in the physical geography of the island. The long-believed-in "central mountain chain," spoken of in almost all histories and gazetteers as traversing Madagascar from north to south, is shown to be only a map-maker's notion; instead of this there is *an elevated mountainous region* occupying the greater part of the central and northern portions of the island, but leaving a good deal of the west

* 'Bulletin de la Société de Géographie,' Août, 1871, p. 82.

† 'Histoire Naturelle, Physique et Politique de Madagascar.' Paris, Hachette et Cie.

coast as low-lying plains, together with the greater portion of the island south of the 23rd parallel of S. latitude. These regions are shown to consist, at least as far as is yet known, of extensive plains at a much lower altitude than the elevated granite region to the north and east.* There are, however, three strongly marked lines of mountains running in a very regular line from north to south, in the western part of the island, and one of these appears to be almost continuous for an extent of nearly 600 miles.

The rocks in this lower western and southern region are said by M. Grandidier to be of Secondary geological formation, a statement confirmed by shells found in the same part by the Rev. J. Richardson, which seem to be identical with those of our Neocomian strata between the Chalk and the Oolite rocks.† In these southern and western plains of Madagascar, it is probable that more thorough exploration and research by scientific travellers will bring to light much that is interesting in geology and palæontology; for it was on the south-western coast that Grandidier discovered the fossil remains of a small hippopotamus, of two species of apyornis, of gigantic tortoises, and of other long-extinct animals. These Secondary regions will most likely be found to be far richer in organic remains than the more barren and bleak granite highlands, which it seems probable are very ancient land, and where no fossil remains have yet been discovered. This granitic region, elevated from 3000 to 5000 feet above the sea, seems remarkably destitute of any trace of organisms in the shape of fossils. It consists of long, bare, rolling moors, mostly of bright-red clay, but occasionally of a light-brown colour, broken up in all directions by lines of hills, the granite and basalt forming the highest points, and in Imérina often forming enormous rounded bosses of rock, and lofty detached masses like gigantic castles and churches. In the Betsiléo province to the south, and in the Ankàrana province in the far north, the most wonderful variety of shapes and outlines are seen in the crowded mountain summits: towers, domes, pyramids, and spires of rock are all present in grand confusion and seeming disorder. There is, however, not an extreme elevation even in the highest points, for the summits of the Ankàratra group of peaks, nearly in the centre of the island, are a little under 9000 feet above the sea-level.

These granitic highlands no doubt formed the island of Madagascar in

* M. Grandidier says, "Je vais maintenant tâcher de tracer en quelques mots la physionomie générale que présente Madagascar. Cette île comprend deux parties bien distinctes; la partie nord et est qui est toute montagneuse, la partie sud et ouest qui est relativement plate."—'Bull. de la Soc. de Géog.,' Août, 1871, p. 100.

† These shells are species of *Ammonites*, *Terebratula*, *Nerinea* or *Turritella*, *Einoce-ramus*, and *Rhynchonella*, together with an *Echinoderm*. Grandidier also says: "Les nérinées et autres fossiles caractéristiques de l'étage jurassique que j'y ai recueillis, ont prouvé l'existence de terrains secondaires qui couvrent une vaste étendue dans cette île."—'Bull. de la Soc. de Géog.,' Août, 1871, p. 88.

the Secondary geologic times, appearing above the waters which covered the southern and western portions as a long and narrow island, about 620 miles in length by 120 in greatest breadth, about a quarter of its present area, and not very different in size from the islands of Java or Cuba. The southern plains, at a height of only as many *hundred* feet above the sea as the granitic region is *thousands* of feet, have probably experienced much greater varieties of condition in the alternations of land and water, and consequently have had much greater fitness to be the abode of successive generations of living creatures.

This elevated region is traversed by a line of extinct volcanic craters, which are found in considerable numbers, and which have a general direction from south-east to north-west, although they are also found at the extreme northern point of the island. This volcanic belt, moreover, extends far beyond the present limits of Madagascar, viz., to the Comoro group on the north-west, and the Mascarene Islands to the east. And it is an interesting fact that although in Madagascar itself there is at present no active volcano, nor has there been, as far as is known, in the historic period, each *extremity* of the line is still occasionally active, viz. in the island of Great Comoro, and in that of Réunion. Subterranean forces not altogether extinct are, however, shown by the hot springs which are found in several parts of the country, and in the slight earthquake shocks which occur almost every year.

Another interesting physical feature of Madagascar is shown in M. Grandidier's sketch-map, namely, the existence of an almost unbroken ring of forest, extending in a continuous line all round the island, except at one point on the north-west coast, where, however, the lines of forest overlap each other about 100 miles, leaving an opening about 70 miles wide between them. On the eastern side this line of forest divides into two, with the long, narrow plain of Ankay and the Antsihànaka province between, but unites again to the north of the latter, where it is broadest, being about 40 miles wide. Its average breadth is about 15 miles.

On this map of M. Grandidier's most of the Hova military stations and the more important places in the interior are laid down; and having had opportunities of testing its accuracy in more than one direction, I feel confident that it is by far the most trustworthy map of the island yet published. Indeed no previous traveller has been so thoroughly prepared by scientific knowledge and with full appliances to make an accurate survey of the country; and as many hundreds of the principal points were fixed astronomically, a reliable basis has been formed for future work. It must, however, be remembered that even M. Grandidier has not traversed the island in every direction, and, as already remarked, extensive portions of it have still to be explored, so that there is still much to be added to this map of the French traveller and savant.

Far surpassing everything else previously attempted as a delineation of *the interior*, must be mentioned the map of 'The Central Provinces of Madagascar,' by the Rev. Dr. Mullens, published together with his book entitled 'Twelve Months in Madagascar,' in 1875. Stretching over five degrees of latitude, from the Antsilànaka province in the north to the edge of the Bâra country in the south, it depicts on a scale of twelve miles to the inch the physical features of the central portions of the island, and the sites of the chief towns and most important villages. The late Mr. James Cameron had previously fixed astronomically some of the chief points in Imérina, and measured a base-line from which the triangulation was constructed, so that a reliable foundation for the map was provided, and the series of angles was extended right into the Bétсилéо. This map is a great gain to our knowledge of the interior, and is full of detail. It is not strange, however, that it will in many parts require revision, while a minute comparison of it on the ground at different points with the country portrayed shows much inequality in its execution, particularly in the relative importance given by the shading to the hills and mountains. Evidently also, as attested by the route-lines shown on the map, extensive portions of the country, which were only seen at a distance (some not even seen at all), can only be considered as approximately correct. But it would be ungracious to dwell upon blemishes when it is such a stride towards a complete delineation of the interior of the country.

Since Dr. Mullens's visit several important contributions have been made towards a fuller geographical knowledge of various portions of the island not previously mapped. Among these are sketch-maps illustrating journeys made chiefly by members of the London Missionary Society and the Friends' Foreign Mission to the Sàkalàva country, due west of the capital, the Bâra province in the south, the southern Tanàla or forest tribes, and the south-east coast, the north-east coast and northern central portions of the island, and the north-west and extreme north.* The results of these journeys were embodied in a map prepared by Mr. W. Johnson, of the Friends' Mission, on the basis of Grandidier, and was lithographed at their press in Antanànarivo, the work being done by native lads. The same gentleman has also published a very minute and complete map of the south-western portion of the central province. In the year 1877, a journey was made by the Rev. J. Richardson (L. M. S.), from the Bétсилéо province to St. Augustine's Bay on the south-west coast, across new ground, and thus much light was thrown upon the north-west portion of Southern Madagascar, of which the greater part is still an unknown region.

Very recently all these later additions to our knowledge of Madagas-

* See 'Recent Journeys in Madagascar,' described by Rev. J. Mullens, D.D., 'Proc. Royal Geographical Society,' Jan. 17, 1877; with map of 'South-east Madagascar and the Bâra Country, from the surveys of Messrs. Sibree, Shaw, and Richardson.'

car have been laid down in a new general map, compiled by Dr. Mullens. This is the largest map of the country yet constructed, being on the same scale as those of the Central Provinces and Southern Madagascar. These are included in it, but three or four other route-maps in the north and south of the island are also given, Grandidier's sketch-map forming the authority for other parts of the country. While this map is of great value as embodying so much recent and accurate research, it does not show at all clearly the strongly-marked upper granitic region as distinguished from the western and southern lower country; the mountains and hills in this are all laid down, as far as explored, but the map does not show at a glance that these rise from a base *itself elevated* from 3000 to 5000 feet above the sea. No doubt it would be difficult to do this, but certainly it is not at all impracticable to skilled cartographers. I also think that although earlier maps are doubtless very faulty, a careful comparison of them would show enough harmony to furnish reliable data for filling in certain portions of the country which are still left almost blank, notably the south-east corner, which is probably shown with tolerable accuracy in Flacourt's map, and in those of other French writers. It is also to be regretted that a bolder style of lettering was not adopted for denoting the chief provinces and tribes. The names of these are not discernible except upon a minute inspection. With these reservations, I think that Dr. Mullens has rendered valuable service to geographical knowledge by the publication of this beautifully engraved map.

There is still, however, much to be done in all directions before we can be said to have a tolerably complete general map of Madagascar; while, of course, there is room for hundreds of more detailed maps of special portions of the country. An island nearly 1000 miles long and about 350 at its greatest breadth gives "ample space and verge" for map-making. Still, so far, every journey lately made appears to confirm the general truth of M. Grandidier's sketch-map as to the broad outlines of the elevated mountainous and granitic region in the northern and central portions of the island. But we still need much information as to the *contour* of this in various directions, and the steps by which it rises up from the plains on all sides. Several sections by the aneroid have been taken, and in one of these it would appear that due west from the capital the central plateau has a saucer-shaped hollow in the centre, both the eastern and western edges being higher than the intermediate portion. This, it will be remembered, is on a small scale what the southern portion of the African continent is on a large one, as shown by Dr. Livingstone's researches. Through deep gorges in these bounding higher lands some of the rivers cut their way to the sea, and it is evident that some of the larger rice-plains, both in Imérina and Betsiléo, were at no very remote period the beds of extensive lakes.

From the usually brilliantly clear and pure atmosphere, and the

large number of prominent and lofty hills all over the central regions of the island, Madagascar offers especial facilities for map-making, as some well-known points can always be seen from which to get good bearings. What is most wanted is that a few more of these be exactly fixed by astronomical observations.

A few words upon the place-names of Madagascar may conclude this already too lengthy paper.

In the western portions of the island, where the Sàkalàva tribes are found, the curious custom of *fady*, or tabooing from common use those words or syllables which form the name, or portions of the name, of their chiefs, has had a very unsettling effect upon the nomenclature of places in that direction. In the Journal of Mr. Hastie, formerly British Resident at the court of Radàma I., it is remarked that "the chieftains of the Sàkalàva are averse that any name or term should approach in sound either the name of themselves or any part of their family. For similar causes the names of rivers, places, and things have suffered so many changes on the western coast that frequent confusion occurs; for after being prohibited by their chieftains from applying any particular terms to their accustomed signification, the natives will not acknowledge to have ever known them in their former sense. This practice very much resembles the jealous monopoly of names by the kings and great chiefs of the Pacific Islands."* Of the influence upon the language of the Malagasy tribes exerted by this custom of tabooing certain words, this is not the place to speak, but it may be remarked in passing that it is doubtless a very important factor in the dialectic differences which are found to exist in the language of the various parts of the island.

The above-quoted remarks as to the formerly unsettled character of the nomenclature of places on the western coast, do not, however, apply to the central and eastern portions of the island; and in the names of mountains, rivers, districts, and towns there is an interesting field of research as yet unexplored, and which will probably yield important information as to the settlement of the country. A cursory glance over a list of village names shows many parallels to English place-names. Thus we have Malagasy "Sunnysides" in Ambòhibémasoàndro, "the place of much sun"; "Oxfords," in Ampitanòmby; "Holytowns," in Ambòhimàsina; "Redlands," in Antàniména; "Stonechams," in Bévato; "Blackwaters," in Onimainty; "Stonebridges," in Antatézambato, &c.; while the very numerous places called Ambòhimanjàka and Ambòhitrandriana are the "Kingtowns" and "Princetowns," of the central provinces, denoting the village of the headman of many small tribes at a time when the country was still divided into numerous petty kingdoms or chieftaincies.

An inspection of a map of Madagascar shows a curious contrast between the nomenclature of the interior and that of the coast-line.

* Tyerman and Bennet's 'Voyages Round the World,' 2nd ed. p. 276.

The former is purely native, as no European power has ever succeeded in retaining territory for long away from the coast ; but the fringe of names along the sea-line has a considerable European element in it, and throws interesting light upon the successive periods during which the Madagascar coast was visited in early times by different European nations, as well as upon the attempts made by some of them to plant colonies in various parts of the island. Besides this, as all surveying and map-making has hitherto been the work of Europeans, and as the naval commanders who gave many of the names of prominent places were usually unacquainted with the Malagasy language, and consequently knew nothing of the native names of headlands, rivers, and bays, they gave many of them European names in a very arbitrary fashion, in many cases, however, not the less embodying an historical fact or date. Thus we may find the day of the year on which several of the capes and islands were first discovered by the Portuguese, who here, as elsewhere, followed their usual practice of calling places they discovered by the name of the saint on whose day they were first seen. The most prominent capes bear the names of St. Mary, St. Vincent, St. Thomas, and St. Sebastian, while, as already mentioned, the northernmost cape, since known as Cape Amber, was long named Cape Natal, because discovered on Christmas Day, and the island itself was long called by them and others, *Isola de San Lorenzo*, after the saint on whose day it was first seen by Fernando Soares. The traces of the Portuguese are also left in St. Augustine's River and Bay, the shoal of Bonaventura, the island of Juan de Nova, and the fine harbour of Diego Suarez at the extreme north of Madagascar. We find another memorial of the same nation in the name of the chief inlet on the eastern side of the island, Antongil Bay, so called from Antonio Gil, a Portuguese, who first discovered it. Besides the names given above, numerous other saints' names are found on ancient maps, as Sta. Justina, St. Romano, Sta. Clara, Sta. Lucia, St. Roche, and others, but these have mostly been disused by later geographers.

The memory of French occupation of Madagascar is retained in the words Fort Dauphin, at the extreme south-east ; in the name of the small island of St. Marie's, still held by them, on the east coast ; and in Foulle Pointe, Louisbourg, Port Choiseul, and other places.

And lastly, an English element in the map, but probably quite unrecognised by the native inhabitants, is seen in the names given by Captain Owen and others to various points, ports, and islands ; as William Pitt Bay, Liverpool Point, British Sound, Port Croker, and Point Barrow, and in Chatham, Andromache, Barren, Barlow, Crab, Murder, and Grave Islands ; while Owen's surveying ships are both kept in memory in "Barracouta" Island, and Port "Leven."

Some of the foreign names given to places in Madagascar have been strangely altered by the Malagasy, both in sound and spelling, so that

one hardly recognises in *Toamàsina*, the native name of Tamatave, the "San Tomaso" of the Portuguese settlers; and still less in *Faradofay*, the "Fort Dauphin" of the south, two centuries ago the chief French port and stronghold in the island.

In Madagascar, not less than in European and other countries, place-names will doubtless prove on careful examination to be among the most valuable of ancient historical records. It is said that the progress of the Hovas from the eastern coast to the highlands of the interior can be traced by the remains of the furnaces they made for the smelting of iron, a manufacture they are believed to have introduced into the country. In like manner it is probable that a careful examination of the names of places would enable us to understand something of the way in which they and the other Malayo-Polynesian tribes possessed themselves of their present territory. In some parts of the country every hill-top has a special name; while there is doubtless both an aboriginal element and an African one in the language which is almost certain to have left some traces in the names of localities—mountains, streams, and districts—if they are only carefully inquired about and noted down. And while we sometimes carelessly ask, "What's in a name?" it will be seen that in this great African island, as well as in other parts of the world, names form, strange as it may seem, more enduring records than tombs and temples, or marble and bronze.

GEOGRAPHICAL NOTES.

The Victoria Nyanza Mission.—The Church Missionary Society have received detailed news regarding the arrival on the borders of King Mtesa's country of the party sent from England by way of the Nile, of which event they were informed by telegram from Colonel Gordon some weeks ago, as recorded in our September number, p. 590. The party, consisting of the Rev. G. Litchfield and Messrs. Felkin and Pearson, were detained by the illness of the last named on the road between Regiaf and Duffi, on the Upper Nile, and they did not reach Duffi till the 3rd of December. Of the two routes thence to Mruli, one across country direct and the other via Magungo and the Albert Nyanza, they adopted the latter, and after various adventures reached Foweira on the 8th of January. At Kisuma they were met by the Rev. Mr. Wilson, who had come from Uganda with that object. Delayed again by illness, they did not reach Mruli till the 27th of January, whence Mr. Pearson reported on February 2nd (the latest date) that they were to start for Mtesa's capital the next day.—The latest news from Uganda was very favourable. King Mtesa still maintained cordial relations with his European guests, Messrs. Wilson and Mackay, the latter of whom appears to have acquired much influence over the king, to the extent of persuading him to abolish the sale of slaves in his dominions.

Mtesa was about to send fifty canoes across the lake to Kagéi to fetch Messrs. Stokes and Copplestone, another reinforcement to the Mission, coming from Zanzibar.

Dr. Emil Holub, a savant of Bohemian nationality, well known in our South African colonies for the zeal and success with which he has explored the interior of the country as far as the Marotse country of the Upper Zambesi, has just returned to Europe after seven years' absence, laden with journals, maps, and collections in almost all branches of science. He has been spending some weeks in England before proceeding to Vienna, but will return later in the autumn. An account of his career and work as a traveller will appear in our next number.

Italian Expedition to Shoa and Central Africa.—According to recent accounts, progress is being made by this important Expedition, after its many misfortunes and long delays. M. Chiarini had started in May 1878 for Kaffa, and had been heard of as being on the 20th of July in the same year at Demekash, in the Gurágwe country. Marquis Antinori, the original leader of the Expedition, who had lost his right hand by a gun accident, is returning home, whilst Captain Martini, having returned from the mission to Italy with which he had been charged by King Menilek, was in July last on his way from Zeila to Shoa. A description of the route from Zeila to Shoa, and of the physical and general condition of the country; a political history of Shoa, and detailed accounts of the ethnology of the country as well as of the Gallas; astronomical determinations of positions, route-maps, and many zoological and other collections have been received in Italy as the results so far of the Expedition.

Missionary Expedition to the Congo.—Intelligence has been received of the safe arrival, at San Salvador, of the Baptist missionary party under the direction of the Rev. T. J. Comber. The party arrived at Mussuca, on the River Congo, July the 2nd, soon after which Mr. Comber sent on the first detachment of fifty carriers, under the charge of Messrs. Crudgington and Bently, following, himself, on the 15th of July, with Mr. Hart and the main body of their native carriers, 100 in number. It is Mr. Comber's intention to leave two of his colleagues at San Salvador, which is to be made the depôt of the Expedition in the interior, while he with the third member of his party will proceed to Makuta, and from there endeavour to reach Stanley Pool on the Upper Congo, above the Kalulu Falls.

Pemba Island, East Coast of Africa.—From a hydrographic notice recently published by the Marine Survey of India, we gather a few particulars respecting Pemba Island and the adjacent coast between Tanga Bay and Chala Island. The information contained in this notice has been derived from Commander W. J. L. Wharton, of H.M.'s surveying

vessel *Fawn*, whose services on the East Coast of Africa were detailed in a despatch from Dr. Kirk, H.M.'s Agent and Consul-General at Zanzibar, to the Foreign Office, published in the 'Proceedings,' vol. xxii. pp. 453-5. Pemba Island, named by the Arabs El Huthera (the Green), lies 23 miles to the north-east of Zanzibar, of which it is a dependency. It extends in a N.N.E. and S.S.W. direction for a distance of 38 miles, and is about 13 miles wide, including the islands on the western side. The western coast is rocky and straight, with only a few slight indentations. The height of the island does not exceed 300 feet, and its surface is broken into ridges and valleys, covered with luxuriant vegetation. The soil is rich, the principal produce being cloves, most of the groves of which trees are situated on the western part of the island. All tropical cereals and edible roots flourish, and on the western side the Wapembe, or descendants of the aborigines, tend considerable herds of cattle; they also send ghee to Zanzibar. Coco-nuts abound, most of them being used for food, while the remainder are sent to Zanzibar to be converted into oil, no oil-making being carried on in the island. The greater part of Pemba Island is under cultivation, or is pasture-land, but a little forest exists here and there. The island is governed by a wali, or governor, appointed by the Sultan of Zanzibar, who resides at Chaki Chaki, the only town of any size, but his power does not extend over the more powerful Arabs of high caste, who rule in their own demesnes in a patriarchal manner. The island is notorious for its large rainfall, and is frequently enveloped in rain-squalls and clouds, when the opposite coast of the mainland is clear. The channel between Pemba Island and the coast of Africa is 25 miles wide at the southern entrance and 17 miles at the northern end. The Bondei Mountains extend parallel to the coast to the westward of Tanga Island at a distance of 23 miles. These are the eastern spurs of the Usambara Mountains (see *ante* pp. 87 and 552), which cover a large tract of country from lat. $4^{\circ} 30'$ S. to $5^{\circ} 20'$ S., and rise to the height of 9000 feet. Mbringa, the most prominent of the Bondei Mountains, is a three-peaked hill, the centre and highest peak of which is about 3000 feet above the sea. At the foot of the mountains the ground is undulating, but appears quite low and flat when seen from the seaward.

Sangir Islands, Malay Archipelago.—Letters have been received from Dutch missionaries settled in different islands of this little-known group, situated north of Celebes, in lat. $3^{\circ} 28'$ N., long. $125^{\circ} 44'$ E. These islands appear to contain a population of 80,000 souls, among whom schools have been opened, and the foundation laid of a Christian Church. Moreover, portions of the Bible have been translated into the *Siamo* dialect, the most central and widely diffused of the dialects of the Sangirese language, and sent to London to be printed, thus adding a new language to the rapidly increasing number brought into printed form.

The Nordenskiöld Expedition.—The *Vega* has been released from her winter quarters and has made a successful passage through Behring Strait to Japan. Thus the north-eastern passage has been at length accomplished, and the enterprising leader of the Expedition thinks that it can be made certain and safe, with a little more experience of the Siberian Sea. The *Vega* was released from the ice on the 18th of July and passed East Cape on the 20th, arriving at Yokohama on the 2nd of August.

Captain Markham's Arctic Cruise.—The little Norwegian cutter *Isbjorn*, with Sir Henry Gore Booth and Captain A. H. Markham, R.N., on board, arrived at Tromsø on September 22nd, after a satisfactory reconnaissance of the ice in the sea east of Spitzbergen. They first fell in with ice on June 4th, 40 miles from the "Goose Coast" of Novaya Zemlya. The Matoshkin Shar was found to be impassable on the 26th, so they shaped a course northwards along the west coast of Novaya Zemlya until they were stopped by the ice off Cape Nassau. On July 31st they passed through the Matoshkin Shar, but found the Kara Sea full of heavy floes, and therefore returned by the same strait. On August 18th they met the Dutch expeditionary vessel *Willem Barents*. The *Isbjorn* was then steered northwards along the west coast once more, and this time they succeeded in rounding Cape Nassau, and reaching as far as Cape Mauritius, the extreme north-eastern point of Novaya Zemlya. Finally pushing due northwards between Spitzbergen and Novaya Zemlya on the meridian of 47° , they met the ice in N. lat. 78° , and succeeded in penetrating through loose streams of it as far north as $78^{\circ} 24' \text{ N.}$, thus reaching within 80 miles of Franz-Josef Land. The explorers have made a good natural history collection, and have done some useful geographical work by adding to our knowledge of the drift and nature of the ice on the most important route that leads polewards.

Danish Discovery on the East Coast of Greenland.—The east coast of Greenland from $65^{\circ} 18' \text{ N.}$ —the most northern point reached by Captain Graah when he made his journey northwards from Cape Farewell in 1829—to 69° N. , the point reached by Captain Scoresby in 1822, remained unknown until this summer. It is shown by a dotted line on the charts. We are informed by Admiral Irminger, of the Danish Navy, that this coast has been sighted by Captain Mourier, commanding the Danish man-of-war steamer *Ingolf*. On the 6th of July last, at 4.25 p.m., he sighted very high land from $68^{\circ} 10' \text{ N.}$, $19^{\circ} 5' \text{ W.}$ (Greenwich),

on the 8th	$67^{\circ} 7'$	"	$27^{\circ} 21'$	"	"
"	9th $66^{\circ} 2'$	"	$30^{\circ} 52'$	"	"
"	10th $65^{\circ} 55'$	"	$33^{\circ} 49'$	"	"

During five days he steamed along the edge of the ice, frequently seeing the land and making sketches of it. On the 10th he was obliged to leave the coast by the ice.

The Dutch Arctic Expedition.—Letters dated the 13th of July have been received from the gallant little *Willem Barents*, which left Amsterdam for her second cruise on the 3rd of June. After a succession of head winds and northerly gales, the explorers sighted the north-west coast of Norway on the 30th of June, and then made for the ice, sounding, dredging, and making serial observations by the way. They found the pack edge on the 5th of July, in lat. $75^{\circ} 30' N.$, long. $26^{\circ} E.$, and then went to Vardö to water ship and post their letters. The Expedition may be expected back about the beginning of November, when, if all goes well, they will have visited the Barents and Kara Seas, and made a valuable series of observations. The officers of the *Willem Barents* point out that Vardö is not properly laid down on the English Admiralty charts, a fact already well known to seamen frequenting the port. The island of Vardö lies nearly due north and south, and is something like the letter H in shape. It has thus two harbours, and there is also anchorage in the sound which separates the island from the north-eastern extreme of Norway. Owing to some unaccountable mistake, all sailing directions hitherto published state that the northern harbour (Vest Vaagen) has a depth of 2 to 3 fathoms, and is seldom used, as the entrance is difficult. The facts are that it has a sufficient depth for vessels of any draught, is invariably used, and is easy of ingress and egress. It is true that serious loss of life and property has sometimes been occasioned by heavy northerly gales; but this is chiefly owing to the crowded state of the harbour during the winter cod fishery. The breakwater which is now in course of construction, will, however, enclose a perfectly secure harbour, and vessels drawing 22 feet might load or discharge alongside the breakwater pier.

The East African Expedition : further information respecting the Death of Mr. Keith Johnston.—Since our last issue we have received further letters from Zanzibar, relating to the death of Mr. Keith Johnston and the progress of our Expedition prior to that event. Some of them were addressed to Dr. Kirk, and have been communicated to us by him. It will be observed that Mr. Thomson, on whom the command of the Expedition has devolved, is pushing on with commendable energy. The letter from Mr. Johnston himself was, with the exception of a short pencil note to Dr. Kirk, the last written by him. The letters are as follows :—

LIWELA (about 44 miles S.W. of Dar-es-Salaam).

May 25th, 1879.

DEAR DR. KIRK,—Our guide's brother goes back to Dar-es-Salaam to-morrow morning, so I take the opportunity to tell you that we are getting on capitally, though we have not made so much advance as I hoped. This place is the second station only from Dar-es-Salaam in the itinerary given me by the guide, but I have not had the least trouble of any sort; the men are all here, and have answered to their names regularly. Yesterday and the day before food was very scarce, but the

men did not complain, and danced themselves to sleep as usual. Our average day's march has been 7 miles; the first day we camped only 3 miles out. The country has been rather uninteresting hitherto, nothing but jungle and little clearings, without a single open view. The Mzinga, a large stream which falls into the Dar-es-Salaam creek, has been crossed four times, and has caused great delay, as it is still flooded and deep; the number of smaller streams crossed has also been large, and at every one the donkeys have had to be unloaded. Unfortunately the sky has been persistently clouded over at night, so that I have got no good observations as yet.

Chuma has been working splendidly; the men seem willing, and we are all perfectly well. Altogether I do not think we could have made a more promising start, thanks to your influence and care. Excellent indiarubber wound up in balls seems to be very plentiful along our route. We have had to be careful of copal-digging holes all along the way.

May 31st.

The man who was to take this did not leave us, but I have an opportunity to send it this morning. We are now all camped at Mkamba, a populous district three marches south-west of Liwela. We have been obliged to delay here to gather food, since, by the most favourable path to Behobebo, we shall have at least seven days of deserted country. The Lufigi people are coming here this year to buy food, as they say the floods have delayed the harvest. I hope to start for Behobebo to-morrow morning. We have had a great deal of rain every day, but we are all happy and well.

KEITH JOHNSTON.

BEHOBEBO, *June 21st.*

DEAR DR. KIRK,—Mr. Johnston being too ill with dysentery to use the pen, he desires me to write to you and inform you of our safe arrival at the above place. There have been no desertions, with the exception of our guide, who disappeared on the 6th at a Uzaramo village called Msangapwani; he had, however, proved to be utterly incompetent. Up to the same date we had rains every day, and until the 16th we were hardly ever out of marshes, with water varying from ankle to waist-deep. It is surprising that we kept our health as well as we did up to the 1st of June, when Mr. Johnston was first seized with dysentery. On the 9th he became too ill to travel. We had to encamp for two days in a forest, and then we moved on with Mr. Johnston carried on a stretcher. He has suffered dreadfully, and if it lasts much longer it will become serious, as indeed it is at present. From Dar-es-Salaam to Behobebo the country has maintained the same wearisome features—the ground perfectly level, most of it submerged in the rains and burnt up in the dry season. The population is exceedingly scant; the vegetation monotonous and uniform, hardly any flowers, no creepers, not a single large tree but scraggy parched-up acacias and so forth. Until the 16th we saw no game. We arrived at the Lufigi on the 15th, and were wofully disappointed at its appearance: its bed being full of sand-islands and banks, with snags sticking up everywhere. The canoes were scarce and of small size. From the Lufigi we struck north-west to Behobebo.

The country round about Behobebo is glorious after what we have passed through, reminding us of Usambara. We are quite close to what I suppose to be the Marui Hills, but I have not had time to ascend them. They appear to be about 800 feet high.

J. THOMSON.

БЕХОБЕНО, *June 29th.*

DEAR DR. KIRK,—On the 21st I wrote informing you of Mr. Johnston's extreme prostration through dysentery. From that date he became gradually weaker, and was unable even to stand without fainting. In the night of the 27th he suffered dreadful pain and passed into an insensible condition, in which he remained all day on the 28th. At 4.15 on that day, to my inexpressible sorrow and dismay, he died. After making quite sure of his death, we performed such offices as are required under such circumstances. I gave orders for the construction of a kind of basket coffin and the cutting of a passage through the dense vegetation to a large tree covered with creepers, where the men dug his grave. To-day we buried him, and on the tree carved his initials and the date of his death. A few feet on one side rises a sharp conical ant-mound, about 12 feet high, which may also serve to indicate where he lies. The chief, named Bago, has undertaken, in consideration of so much cloth, to keep the place clear of vegetation. I have gathered together his letters, personal effects, &c., and send them to you.

You may well understand I feel my altered position very keenly, incompetent as I am to deal with many geographical details. It will take some time to get used to the sextant and one or two of the other instruments. Try and get some further instructions forwarded to me, I suppose by Ujji, as I expect to be near the lake by the time letters can get up. Any hints from yourself will be valuable. As I have still a good deal of work to do before I start, I do not intend making any report to the Society of our journey up to this place. Besides, the route for half the distance has not been worked up and mapped, and I have to grope my way somewhat cautiously in these particulars. I will send it down from Ukena, however, if all goes well; I propose to start on the 2nd July.

J. THOMSON.

БЕХОБЕНО, *June 30th, 1879.*

To the Secretary of the Royal Geographical Society.

SIR,—It is with great sorrow I have to inform you of the death of Mr. Johnston, which event happened on the 28th inst. at 4.15 P.M. I had previously reported to Dr. Kirk our arrival at this place, where our deceased leader hoped by a rest of a few days to recover. On the 22nd he was removed into a hut built specially for him. From that date he gradually became worse. On the 26th he fainted several times, and was evidently dying rapidly. Everything that we could do to assist and relieve him we did, but it was unfortunately but little. On the night of the 27th he became insensible, and he remained in that condition until 4.15 P.M. on the following day, when he died.

In the evening we performed the usual offices to the dead, and on the 29th a sort of basket coffin was constructed and his grave dug. About midday we buried him. He lies at the foot of a large tree festooned with light creepers amid a surrounding of dense foliage. A few feet on one side rises a sharply conical ant-hill 12 feet in height, which may serve to indicate his burial-place, while on the tree we cut his initials and the date of his death. The chief of the village, named Bago, has undertaken for some cloth to keep the grave clear of vegetation and in good order.

It will now be necessary for me to speak of the future prospects of the Expedition. I cannot but feel that at the present time I am quite incompetent to deal with much of the geographical work, as I have had no practical acquaintance with it. Yet, by seeing Mr. Johnston constantly at this work, I have learnt a little, and have hopes that in a short time I shall be able to do it, though in a rough sort of way. The sextant will be my greatest difficulty. I should have liked to forward you an account of our route as far as Behobeho, but I find that it will be impossible, as the map has only been worked up six marches, and would take me many days to finish

up to this place. Besides, I am anxious to push on at once, as out of the six weeks we have been on the march, three have been spent in halts, either to collect food or owing to Mr. Johnston's illness. A final reason is, that I am afraid of missing the August mail from Zanzibar.

In the meantime all I have to report is that we have passed through a country of the most monotonous character. Level sandy plains varied by marshes are its main features. Flooded in the rains, and burnt up in the dry season, it is only inhabited at isolated points. Twice we marched three days without seeing signs of any human inhabitants. On the 15th of June we reached the Rufigi, which is, at the village of Mzetusa, about half a mile broad, and full of islands, sandbanks, and snags; quite unnavigable, except for canoes, though in many parts it is deep, and the current is strong. From Mzetusa we had four marches in a nearly W.N.W. direction to Behobeho.

Let me now say a few words about our future movements. On the 2nd of July I propose to start, and, going west seven days, to reach the large Khutu village of Mgunda. Thence we turn south, and camping in the jungle the first day, reach the Ruaha on the second, the river being fordable at the crossing-place. Two days' march from this will bring us to the Urunga, and in two more we hope to reach Ubeni. The country through which we shall pass is described as well-peopled and level, with plenty of food obtainable. The Ruaha is distant two days' march from here.

J. THOMSON.

ZANZIBAR, *July 23rd, 1879.*

To the Secretary of the Royal Geographical Society.

SIR,—The enclosed letter of June 29th will convey all the information we yet possess regarding the sad loss the Society has sustained in the death of Mr. Keith Johnston, the leader of the Expedition sent to examine the country between the coast and the Lakes, and also with regard to the course Mr. Thomson now proposes to follow.

This Expedition set out, as you are aware, under more favourable auspices than any other that has been equipped for African exploration. From the day of leaving Zanzibar up to that of our latest intelligence, there has not been a single desertion, save only that of a guide engaged on the coast and not forming part of the permanent Expedition. There have been no disputes regarding loads, although the porters were in my opinion more heavily weighted than those of any other expedition I have seen start, and the best possible understanding has been maintained both within the party and amongst the natives, under circumstances which would try the temper and test the qualities of the leader.

The country, from Dar-es-Salaam on the coast to Behobeho, a village in Khutu, north of, and not far from the junction of the two rivers that unite to form the Rufigi, is described as a monotonous grassy plain, swampy and wet during the rainy season, dry and parched up for the rest of the year. On two occasions the explorers passed three days away from human habitations in crossing this region, and it was during this time that Mr. Keith Johnston was first seized with a disease that killed him after an illness of twenty-eight days. Mr. Thomson's letter of June 21st, which I enclose, will show how the illness began on the 1st of June, just as the rains were drawing to a close, and the country appeared more dry and healthy.

In a pencil note dated June 7th, the last personal communication I received from Mr. Johnston, no notice is taken of the symptoms which must then have shown themselves; we may, therefore, conclude that the disease began in an insidious manner, and that his strength was seriously affected before measures were taken to avert its progress.

From my knowledge of Mr. Keith Johnston, having seen him daily during his

stay in Zanzibar, and been thrown in close relation with him at every step in the organisation of his party, having been led to esteem him also in the more friendly relations of life, I feel that the Society and geographers have lost one who would have greatly extended our knowledge of Africa, and who in visiting new lauds would have left behind him among the people nothing but favourable impressions of their first contact with Europeans.

The Expedition now passes into the hands of Mr. Thomson, who I think has acted wisely in going on and following, as far as he can, the instructions of the Society. It is impossible, nevertheless, to ignore the fact that the accurate geographical results on which the Society could have so confidently relied, will not now be obtainable, and that some time will necessarily elapse before the second in command can make himself familiar with the use of instruments which he has hitherto not been called upon to handle.

The Rufigi having been reached by the Expedition at a place below the junction of the Urunga and the Ruaha (no doubt in order to obtain food), was again left without being crossed, for the purpose of pushing on to Behobebo in Khutu, a populous and fertile district. Mr. Thomson now proposes following the route projected by his late leader, and crossing the Ruaha towards the country of the Mhenge, said to be Mavite, or of Zulu origin.

One set of letters which I forwarded to Behobebo reached that place about the 22nd June; they were received and read by Mr. Johnston, and the messenger who carried them remained at that place until the 29th of June, and was present at the funeral of the deceased traveller. I have since sent off two sets of letters, which however have been returned from the coast on its being known that the party had set out from Behobebo for the Mhenge country. In future I can only suggest that letters be sent, in duplicate, one set being forwarded to the Mission at Livingstonia to be sent should occasion offer, to the north end of Nyassa, and the other to the Mission at Ujji, to be sent by any opportunity to the south of Tanganyika.

JOHN KIRK.

Obituary.

The Rev. Joseph Mullens, D.D., whose unexpected death near Mpwapwa on July 10th was recorded in a footnote at p. 590 of the 'Proceedings,' was born on September 2nd, 1820, and received a portion of his education at Coward College; he afterwards completed his studies at University College, London, and at Edinburgh University. He was ordained in September 1843, and soon after went to Calcutta. Besides undertaking more purely missionary work, he was long connected with the Bhowanipore Christian Institution. During the first part of his residence in the East he visited many parts of India, and especially a large portion of the upper provinces. In 1857, in consequence of the high position he had taken in educational matters, he was appointed a member of the governing body of Calcutta University, and about the same time received the honorary degree of D.D. from William College, Massachusetts; a similar distinction being afterwards conferred on him by Edinburgh University. Dr. Mullens came home in 1859, but returned to his work in India in 1861. The Directors of the London Missionary Society, with due appreciation of his administrative power and energy, in 1865 invited him to become the assistant of Dr. Tidman, their Foreign Secretary, who was then in failing health, but before returning to England, he visited the Society's stations in Southern India and China. In 1866 he became the Foreign Secretary of the Society, which post he continued to fill to the time of his death. After a brief visit to Canada, Dr. Mullens went to Madagascar in 1873, on business connected with the Mission, and spent about a year there, and in consequence of that visit he always took an active interest

in all that related to that island. Gifted with scientific tastes and a love of geographical exploration, he devoted much of his leisure time to visiting the less frequented parts of the country and making an accurate general survey of his routes. As a result of his investigation there, he contributed to our 'Journal' (vol. xlv. p. 129), a paper on the Central Provinces of Madagascar; and (vol. xlvii. p. 47), another entitled "Recent Journeys in Madagascar." The latter paper was illustrated by three valuable maps, drawn partly by himself or under his own direct superintendence, in which much original information was embodied. In February 1877, Dr. Mullens read a paper before our Society, describing a new route and new mode of travelling into Central Africa, adopted by the Rev. Roger Price in 1876, which appeared in our 'Proceedings' (vol. xxi. p. 233). The great interest which he took in the mission to Lake Tanganyika, led him, with much self-denial, to volunteer to proceed to Ujiji in the spring of the present year to aid in the reorganisation of the London Missionary Society's Mission in that remote region. His departure for Zanzibar on April 24th was recorded in a Note in a former number of these 'Proceedings,' p. 328, in which a sketch was also given of the geographical work he proposed to carry out in the Lake region of Central Africa. But for this somewhat sudden resolve on his part, which has resulted so unfortunately, no less for the work of the Mission than for geography, Dr. Mullens would have read a paper on recent geographical discoveries in New Guinea at one of our evening meetings during the past session. One of his latest services to our science was to compile for the London Missionary Society a map of Madagascar on a scale of 1 : 750,000, a fine cartographical work containing the results of his own surveys and the routes of all recent travellers, many of whom were members of the Madagascar Mission, whose zeal for geography was inspired by Dr. Mullens himself. Just before leaving England, he also edited a map of East Central Africa (taken from Mr. H. M. Stanley's larger map, with additions from later authorities), which was used to illustrate a *brochure*, giving an account of the London Missionary Society's Mission in Central Africa, from the letters of the late Revs. J. B. Thomson and A. W. Dodgshun, and of Messrs. E. C. Hore and W. Hutley. Dr. Mullens was the author of several works, chiefly bearing on his missionary labours in India and Madagascar. He was elected a Fellow of our Society in 1877.

Mr. George Long, M.A., died at Portfield, Chichester, on August 10th, aged 79. Mr. Long was born at Poulton, Lancashire, in 1800, and received his education at Macclesfield Grammar School, and Trinity College, Cambridge. He achieved considerable distinction during his career at the University, both in mathematics and classics. He took his B.A. degree (as a wrangler) in 1822, and shortly afterwards became a professor in the University of Virginia. He returned to England in 1825, and took an active part in the foundation of London University, in which and its successor, University College, he held professorships. In 1849 he became classical lecturer at Brighton College, from which post he only retired in 1871. Mr. Long was one of the promoters of the Society for the Diffusion of Useful Knowledge, for which he edited the 'Quarterly Journal of Education'; he was also editor of the 'Penny Cyclopædia,' joint-editor of the 'Bibliotheca Classica,' and a large contributor to Dr. William Smith's series of dictionaries; besides which he published several works in his own name, mainly in connection with classical literature. Mr. Long had been a Fellow of our Society since 1830, and for many years took an active interest in its management. He was a Member of our Council from 1831 to 1839 (when he became a Vice-President for two years) and from 1841 to 1846; he discharged the duties of Honorary Secretary from 1846 to 1848, when he again served as a Member of Council till 1851. Mr. Long contributed "Remarks on the Rivers of Susiana and Site of Susa," to the twelfth volume of our 'Journal' (1842).

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION—SHEFFIELD MEETING.

(Continued from p. 607.)

Thursday, August 21st, 1879.

The Valley of the Don. By the PRESIDENT.—This paper was read by the President as the Second Part of his opening Address, being the application of the principles of Geographical Study set forth in the First Part. He said his objects were to point out the ready means of acquiring geographical knowledge at our own doors, and to explain the connection between geography and other sciences, especially geology, by making use of the illustrations furnished by a special region. He would endeavour to show, although geography requires the aid of other sciences, that nevertheless it formed a distinct body of knowledge, with its own objects and its own methods of research.—The river basin of the Don, the region of which Sheffield is the capital, occupies an area of 600 square miles, and is about 40 miles in length by 15 to 20 miles wide. It extends from the central water-parting of England eastward to the tidal waters of the Ouse, and from the sea-level to the highest peaks on the water-parting there is a rise of nearly 2000 feet. At the first glance over this region, we see at once how diversified are the physical features it presents, from craggy heights round the sources of the Don to the levels of Hatfield Chase and Thorne Waste. This diversity assists an inhabitant to study, round his own home, many of the geographical problems which he reads or hears of in connection with distant regions, where nature has worked on a grander or more extended scale. Instead of confining himself to the study of books, he may go to the book of nature which is open before him, and to which he will return with ever-increasing delight and interest. For almost every geographical point that he meets with in the course of study will be found illustrated in the physical features of his native river-basin; and if the chances of life lead to his becoming a traveller in distant lands, he could have had no better training than a study of the valley of the Don affords. A range of mountains containing the sources of the Don extends for some 20 miles, and forms the western rim of the river-basin. To the north is Ramsden Clough, where the Don and Calder take their rise, and near here the Holme Moss attains a height of 1860 feet. The country is diversified by high hills of moorland and deep valleys, through which the Don makes its way until it reaches Penistone, when it takes a sharp turn to the south and flows along the eastern skirts of the hills, receiving several tributaries. First, the Little Don rises on the Langsett and Harden Moors, and falls into the parent stream at Deep Car. Next comes the Ewden Beck, flowing down a moorland dell, and joining the Don opposite to the woods of Wharnccliffe. The Loxley rises in a desolate and mountainous waste on the borders of Derbyshire, and is at first a torrent—the Dale Dyke, dashing over a rocky bed amidst beautiful and romantic scenery. At the village of Loxley the river runs through a narrow gorge, with precipitous crags on either side, and at Malin Bridge it opens on a plain where the Loxley and Rivelin unite, and falls into the Don. Lastly, the Sheaf and Porter brooks, flowing through vales which were once very beautiful, unite in this town of Sheffield, and also send their waters to swell the Don. . . . These tributaries drain the wild moorlands, while the river which receives them flows from north to south, from Penistone to Sheffield, down a deep glen along the foot of the western hills, and confined on the east by the steep forest-clad escarpment of Wharnccliffe, with a background of higher fells. At Sheffield the Don entirely alters its course, turning to the north-east, and flowing through a country diversified by high hills and deep valleys, but still far less rugged and lofty than the western hills,

which are drained by the torrent-like affluents. Here the Don receives the Rother from the south ; and some miles further on, the Dearne, with a course entirely within this lower and less rugged country, enters from the northern side. . . . After leaving Conisborough, a change takes place in the scenery. There is a plateau, some 4 or 5 miles in width, and extending north and south across the river-basin, terminating on the west with a clearly defined escarpment. Through this plateau both the Don and its tributary, the Went, flowing in a parallel course to the north, have to force their way. The rivers flow through narrow valleys of fertile pasture bordered by wooded banks, and the western escarpment, in the Went valley, is bold and picturesque. Leaving this region at Hexthorpe, the Don enters a level plain which, beyond Doncaster, is in places overlaid with peat, and there are wide stretches of marshlands called carrs ; a vast level extending to the Humber.—Such are the general features of the Don river-basin, which would strike the least observant traveller. But the physical geographer investigates and explains the occurrence of these features. He inquires why the western hills are the loftiest and most craggy ; why the Don changes its course and flows in a deep trough along their skirts ; why the adjoining country, though still hilly, is softer in outline. He examines into the reason of the existence of a belt of plateau land through which the Don and Went have to pass in scarped ravines ; and into the causes which have led to the formation of the vast levels extending from Doncaster to the Humber. In these researches, our science receives aid from geology, which tells us the nature of the various rocks and the influence they have on the varying features of the earth's surface as we now see it. We do not concern ourselves with the way in which the rocks were originally formed, with lists of fossils with long Latinised names, or with the condition of the earth's surface in the remote ages when those fossils were living creatures. We are only interested to know the nature and texture of the rocks as they now exist, the order of their deposition, and their economic uses. This information teaches us the causes which have produced the varied configuration of the surface as we now see it. Geology tells us the story of the formation of the Pennine range of mountains where the Don and its tributaries have their sources. The disturbances which the beds of rock have undergone have had the effect of crumpling them up into a number of troughs and arches. As each arch was raised up, the denudation took slice after slice off its crest, so that along the saddle of each anticlinal line the lower beds were laid bare, and now appear on the surface. The Pennine anticlinal, of which the hills containing the sources of the Don form a part, is a broad arch extending north and south from Scotland to Derbyshire. Along the central line of this arch, in the part whence flow the Don sources, the hard, massive sandstones of the millstone-grit come out and, on account of their hardness, stand up in a chain of rugged and lofty hills and moorland plateaux. It is the hardness of the rock in the millstone-grit formation which produces the strongly featured country of this part of the Pennine range, and, by offering greater resistance to denudation, maintains the superior height of these hills over all the country on both sides. Where the Don makes its great southerly bend from Penistone to Sheffield the surface formation has changed, its course is then over the lower coal measures and skirting the edge of the millstone grit. In this fact, no doubt, is to be found the reason of the direction taken by the river. The country where the lower coal measures form the surface shows a repetition of the features of the millstone-grit region, but somewhat less marked, and with less elevation. On leaving Sheffield, the Don changes its course and enters the country of the middle coal measures, where the bold features which characterise the lower coal measures and the millstone-grit are missing. Here again there are indications of the causes which decided the direction of the river-bed. There are two faults ranging in a

north-east direction from Sheffield, along either side of the valley of the Don, towards Conisborough, and between these faults the rocks are much contorted. The southerly Don fault passes south-west to north-east through Sheffield, along the south-east margin of Don Valley to near Aldwark, and runs on by Thrybergh and Hooton Roberts to Cadeby. The thick beds of sandstone which alternate with the coal in this formation often form bold escarpments, such as the ridge which adds so much to the beauty of Wentworth Park. We can next account for the picturesque ravines through which the Don and Went find their way before reaching the levels. For here is the more recent Permian formation of magnesian limestone which extends in a narrow belt 4 or 5 miles in width, right across Yorkshire from the North Riding to Nottinghamshire. Wherever the rivers force their way across this limestone, we find picturesque scenery. Outside the Don valley we have Jackdaw Crag, near Thorparch, rising over the River Wharfe and Anston Rocks to the south, within the Trent drainage system. On the south-east bank of the Don also there is a bold escarpment; and the Went is, on either hand, bounded by precipices of limestone, where it cuts its way through the Permian formation. Eastward of the magnesian limestone, which forms a distinct escarpment across the river-basin from north to south, is the Trias formation, consisting of the deep red Bunter sandstone on which the town of Doncaster is built. But the Trias only occurs in patches, and is generally overlaid by the muddy deposits from the Humber, on which are the wide expanses of level peat-moss, ranging from 1 to 20 feet in thickness. In cutting through this peat, cones of Scotch firs have been plentifully found, and in the lower layers there are stumps of trees firmly rooted into the sand, proving that a forest once grew there.—It will have been seen how the geology of the Don basin helps us to understand its physical features. The different formations decide the position of the water-parting, the direction of the drainage, and even the character of the scenery. A knowledge is often desirable, not only of the surface rock, but also of the formation which underlies it. When, for example, the magnesian limestone rests on a hard sandstone, its escarpment often rises to more importance than when its foundations are on a softer rock.—The distribution of plants, which is another and very interesting branch of inquiry in the study of physical geography, is decided chiefly by climate and altitude above the sea, but it also depends a good deal upon the soils and the formations from which they come, and here again geology is useful to the geographer. Meteorology is also an important element in the study, not only as determining climate, and its influence on plant-distribution, but as affecting the hydrography of a region, and the amount and rapidity of denudation. Its study should not be confined to mere registration, the barren results of which have too often been demonstrated. It is very seldom that reliable observations range over a sufficiently long time to give useful results even in countries where there is a trigonometrical survey (the height of civilisation), and scarcely ever in less advanced districts. In Mr. Harrison's interesting history of the flood of 1864, I notice a record of the rainfall in the Dale Dyke Valley, varying from 46 inches in 1849 to 38 in 1861; and at Barnsley, within the Don valley, there was an extraordinary difference between the annual rainfalls of two succeeding years, namely, 42 inches in 1872, and 16 in 1873. The latter example shows the necessity for a series of observations extending over many years. The geographer, in his meteorological researches, should not of course neglect registration. On the contrary, he should be habitually exact on this point; but he should be careful, at the same time, to collect all kinds of information respecting normal and abnormal seasons, and all other particulars which might serve both to supplement and to check his observations.—In all these branches of the subject the comparative elements should

be kept in view. We must look back as far as the records of history will allow us, to learn the cause of the present state of the surface of our district, from its past condition at various historical epochs. It is here that the historian and the topographer come to our aid. Time is a powerful and active agent in these changes; but the most interesting and instructive side of the subject is the examination of the effects of human agency in the changes on the earth's surface. From this point of view the history of a mountain range frequently offers a most valuable subject for study. Mountains usually supply within themselves a natural regulator which checks the rapid flow of the rain-water in surface drainage. The absence of such a regulator causes disastrous floods. The regulator acts as a sponge, and is supplied either in the form of a large area of forest, of swamps, or peat bogs, of a system of lakes, or of artificial reservoirs. Where there are no forests, nature usually supplies their place with swampy moors. The surface of the wild moors where the springs of the Don and its tributaries take their rise is covered with heath and ferns, and in winter, after heavy rains, the ground is spongy, and persons have been lost and buried in it. A knowledge of these moors explains the route taken by William the Conqueror in February 1070, in his winter march from York to Chester. The horses of the knights were swallowed up by the treacherous swamps, and swept away by the torrents; and the record of Ordericus Vitalis gives a vivid picture of a march across the Pennine chain in midwinter 800 years ago. In this condition it long remained, and even now the unchanging hills are little altered. But at the same time that cultivation encroached on the moorland sponge, the necessities of great centres of population have called for the construction of large artificial reservoirs, which also serve the purpose of regulating the flow of surface drainage. There is the artificial lake at Dunford Bridge, near the main source of the Don. The reservoir at Barker Pool, in use since 1434, appears to have been the first artificial attempt to store water for use in Sheffield, and afterwards a chain of dams in the valley on Crookesmoor met the demand. In 1864 the Dale Dyke, or Bradfield Reservoir, was completed, covering an area of 78 acres; and on the 11th of March it burst through the dam, making a breach 100 yards long and 70 deep. This appalling catastrophe, so admirably described by Mr. Harrison, shows the irresistible power of floods in motion, which, in other countries, are the work of nature unaided by the labours of man. The cataclysms of the Indus, for example, in 1841, and of the Sutlej, 1819, were caused, not by the faulty construction of an engineer's dam, but by the rending away of a shoulder of a mountain which had fallen into the river-beds. But the effects were similar. The lesson of the desolating flood of 1864 was profited by in Sheffield and the work of storing water proceeded. In 1869 the Agden Dam was completed. The Strines Reservoir was finished in 1872, the Dale Dyke in 1874, and the Dam Flask in 1875, the united area forming 300 acres of water. The necessity for the storage of water, owing to the destruction of forests, and for irrigation purposes, is often a subject of discussion with reference to other mountain ranges, and to disastrous floods in other countries; and the native of Sheffield may acquire a practical knowledge of many sides of an important problem by an observant exploration of the hills and moorlands within a few miles of his own home.—The effects of human agency on the aspects of nature are also very strikingly displayed in the country between Sheffield and Doncaster, and northwards towards Barnsley and Pontefract. Now this region is alive with busy collieries, ironworks, and quarry workings—is covered with cultivation and intersected by canals and railways. Within historical times it was a vast forest, with patches of cultivation at long intervals, and dominated by the mighty barons, the Furnivals and Warrens, in the feudal castles of Sheffield and Conisborough. There are still patches of the primæval forests, or at least tracts which have never been under cultivation. The parks of Wentworth and Wortley

and Thrybergh have probably never known the plough, and in the smaller area of Aldwark there have been Clarels, Fitzwilliams, and Foljambes for at least six centuries. One would expect to find plants, the survivors of an old forest or marsh flora, in these patches, which are unknown or uncommon elsewhere; and this appears to be the case. We are told, for instance, that at Aldwark the rare *Stellaria glauca* grows, and that the *Carex elongata* has been found there, though not recently. It is probable that many points of geographical interest would be deduced by an intelligent observer who makes a careful comparison of the descriptions of the country in past times with its actual condition. But the most remarkable effects of human agency are to be observed in the levels upon which the Don enters after leaving the town of Doncaster. The vast expanse of levels comprised in Hatfield Chase, Thorne Waste, and Goole Moors covers several square miles. Hatfield Chase alone has an area of 70,000 acres, and was a wild country consisting of forest and moor, intersected by watercourses and dotted with large pools and swamps. The waters of the Don spread over this expanse, the overflow finding its way to the Trent at Adlingfleet. The Idle, now part of the Trent system, also emptied its waters into the great levels. There were large meres or lakes yielding much fish, and frequented by all kinds of waterfowl, and boats were the means of communication between Thorne and Hatfield. There were a few islands rising above the level, such as Lindholme, in Hatfield Turf Moor, which could only be reached in seasons of extreme drought.—In 1626 the famous undertaking was inaugurated which has effected so marvellous a change in this part of the Don basin. In that year Cornelius Vermuyden, of Tholen, in Zeeland, with the aid of Dutch capital and Dutch labour, undertook to drain the levels. The south channel of the Don, by which it discharged its waters into the Trent, was to be stopped, and all the waters were forced into the north channel to flow into the Aire. The River Idle, which spread its waters over the level, was to be stopped also, and carried by a new channel into the Trent; and deep drains were to be cut to the Trent from the great ponds and swamps round Thorne and Hatfield. The Dutch labourers, who understood the work thoroughly, made rapid progress; but there was one great mistake in the original design. It was soon found that the north channel could not carry off the Don water to the Aire, and there was great loss from floodings of the adjacent lands. It then became necessary to make the existing straight cut from the Don to the Ouse at Goole, which is known as the Dutch River, and this added so largely to the cost that it prevented the undertaking from being commercially successful to the first adventurers. Many Dutch families, however, settled on the reclaimed lands; and one of their descendants, Abraham de la Pryme, wrote a history of the undertaking. The change has been wonderful, and it now seems almost incredible that boats were once the means of communication between Thorne and Hatfield. The fertility of the banks of the Ouse has also been marvellously increased by the system of warping which was introduced early in the last century. Mr. Ralph Creyke, of Rawcliffe, warped 429 acres, and received the gold medal of the Society of Arts in 1825 for his interesting paper on the subject. Warp is a fine light-brown sediment held in suspension in the river. It is soft and silky to the touch, and contains numerous glistening scales of mica. The land to be warped is surrounded by a substantial bank. The water is then admitted, and kept there by closing the flood-gates until the second return of the tide, when it is allowed to flow off. The same process is repeated at the next tide, mud being deposited. Thus either a new soil is created or a thin and poor soil improved, there being 12 to 16 inches deposited in one season, and even more. Indeed, as many as 10 to 15 acres have been known to be covered with 2 or 3 feet of warp during one spring of ten to twelve tides. An expert warp-farmer can, by careful attention to the currents, even temper his soil as he pleases,

for the heaviest particles are first deposited, which are those of sand. Then a mixture of sand and fine mud, the most valuable soil. Lastly, the pure mud subsides, which is rich but tenacious. The great point is to get the second and mixed deposit over the whole surface, and this is done by keeping the water in constant motion, for the last deposit only takes place in still water. Mr. Caird mentions that fifty years ago Armyn pastures, near Goole, were mostly under water, a breeding-place for wild ducks, and the rest yielded a few cranberries. Now 400 acres are under crops. We thus see the important influence that human agency has had in determining the character of the earth's surface, and of what consequence a study of the history of that agency must always be to the comparative geographer. Away in the western hills large artificial lakes have altered the face of the wild moorlands. In the region between Sheffield and Doncaster the forest haunts of Robin Hood have disappeared before the collieries and ironworks, the cultivators and quarriers of modern times. In the levels high cultivation and warp-farms occupy the sites of wide lakes and swamps and dreary wastes, while the courses of the rivers have been altered. Kindred changes have taken place or are in progress in other parts of the world, often upon a much larger scale; so that a study of the effects of human agency in the valley of the Don is an admirable training for a more extended examination of the facts of comparative geography.—Our science also occupies itself with the economic statistics of the earth, with the circulation of trade and the products of various regions. Geographers note, for example, the uses of rocks and soils, and the mineral resources of a district. In the millstone-grit range of hills it belongs to geography to record that the lowest grit or kinderscout furnishes blocks for engine beds, for foundations, and reservoir works, but that there are difficulties in making use of it owing to the wild and inaccessible character of a great part of the country in which it is found. We should note that the second grit is quarried for road-paving, and that the first or upper grit (called rough rock) is good building stone; that the lowest underclay of the coal measures is a valuable fireclay which is largely wrought; that the Elland flagstones are extensively quarried and cut into blocks and slabs; and that the magnesian limestone is used for lime-burning and repairing the roads. We should also note the positions and yield of the collieries, the statistics of the iron trade, the agricultural statistics, and the commercial routes, as well as the distribution of population. Many of these vital interests of the region are capable of cartographic illustration.—This region round Sheffield is fortunate in its writers, who have made the road easy for future students. The local poets, Ebenezer Elliot and James Montgomery, were endowed by nature with geographical instincts. Few districts have had such topographers as Hunter and Eastwood, Holland and Gatty, or so able an antiquary as Mr. Stacey. The authors of the 'Geology of the Yorkshire Coal Field' have furnished a detailed history of the rocks; and in their admirable work on the physical geography and botanical topography of West Yorkshire Mr. James W. Davis and Dr. Lees have rendered you an inestimable service. From their work the author had derived many of the ideas and a great deal of the information which had been submitted in this paper.

The Trade Routes from Bengal to Tibet. By Lieut.-Col. T. H. LEWIN (late Deputy Commissioner of Darjiling).—In the absence of statistics of the actual trade which the author had not had time to obtain from India, a general view only could be given of the nature and extent of the present exports and imports between India and Tibet. The chief wealth of Tibet lies in her flocks and herds; and were the passes open and the roads improved, large quantities of cows, sheep, and goats, wool, cheese, and butter would find their way to our territory. At present, the export of live stock is limited to the carrying capacity of the animals themselves. The Tibetan traders drive in before them sufficient sheep, goats, or yak to supply

them with food on the road, and to carry the goods and merchandise which they bring with them. No trade in live stock is carried on, save that a few ponies come in for sale, and of late years even these have decreased in numbers and increased in price. Other articles brought to India by Tibetan traders, are—coarse woollen blankets and carpets, sheep's wool (to northern and central Himalayan districts), yaks' tails, musk, borax, and rhubarb. The country abounds in minerals, which are not worked, except gold in a rude fashion. The gold-fields extend along the base of the southern watershed of the Brahmaputra, and the gold-diggers come chiefly from the country round Shigatze. But the most important of all the exports from Tibet is brick-tea, obtained from Sze-chuen, from a coarse-tasted leaf, which the inhabitants, however, prefer to the finer teas grown in our own plantations of Assam and the Himalayan valleys. Tea is one of the principal sources of revenue to the Lhasa Government, and the trade is guarded with jealousy from foreign competition. The imports into Tibet are far more important at present than the exports: chief among them are English broadcloths and woollens. The great lack of fuel and the cold dry air of these high mountains render warm clothing an absolute necessity of life, thus the cold-weather clothing of a Tibetan is almost like a vast moving bed, and our English broadcloths are highly prized. The Tibetans are somewhat superstitious as to the colours to be worn. They will not wear blue or black, and only persons of rank wear velvet; their favourite colours are scarlet, purple, a liver-brown, and a snuff-coloured yellow. Turkey-red cloths, prints, and flowered calicoes are in good demand. Imitations of Indian handkerchiefs and Cashmere shawls are very popular among the lower classes; chintzes do not seem to be worn. Cottons are not used, save for linings, and also as coverings for sacred pictures. Cheap silk handkerchiefs would meet with a large sale here, especially if the sacred sentence *Om mani padmi houn* were woven into the fabric. There is a good demand for indigo and opium. Quicksilver, vermilion, and red and white lead are also imported in considerable quantities, for gilding the roofs of religious houses. Wall shades, chandeliers, tumblers, wine-glasses, small mirrors, and lanterns find a ready sale. English cutlery, knives, and scissors are much prized, and if our manufacturers would condescend to work upon native models a much larger sale would be commanded.—After passing in review the various trade-routes from India to Tibet, via Assam, Bhutan, Darjiling, and Nepaul, and giving a brief historical sketch of our commercial and political relations with Tibet, Nepaul, and Bhutan, the author summed up by saying that he thought the arguments in favour of a trade-route from Darjiling to China via Tibet were very strong. Lhasa is less than a month's journey for an unladen man from our frontier; once there, the old-established trade-routes between Tibet and China are open to us, leading by well-known roads to the great river-basins of the Hoang-Ho and the Yang-tsze. The great province of Sze-chuen, with its thirty millions of inhabitants, would be opened up, and its silk, tea, rhubarb, musk, jade, amber, and cinnabar obtainable in exchange for British manufactures. The inhabitants of Tibet are a peaceful, well-educated, and commercially well-disposed race. The routes through Burmah have been tried and have failed. A better route to China may perhaps be found through Assam, but only when railway communication shall be extended up the valley of the Brahmaputra. In future this will be the best road, but for the next fifty years the central route via Darjiling will no doubt be the best. The Tibetans are Buddhists, and the creed of Buddhism is based on the equality and brotherhood of mankind. It will not be religious intolerance which bars the way to Lhasa; the real obstacles to be contended with are, and will be, commercial interests. It is the interest of the Lamas or governing classes to exclude us, for at present they hold a practical monopoly of the trade, and profit largely both from the duties on imported goods, and by the sale of

permits to the traders; and it is also the interest of the traders to keep us out; for competition would be ruinous to their present high rate of profits. The real cause of Chinese opposition to us in Tibet, lies in the fear that we shall oust them from their commercial and political pre-eminence in the country. In conclusion, the author urged the necessity of our insisting on the carrying out of the privileges with regard to Tibet granted to us by the Chefu Convention. A clause in this treaty sanctions our intercourse with the country, and authorises our sending a mission thither. This mission should be sent, and we should direct our efforts to establishing permanent trading agents or consuls at Shigatze and Lbassa, or trading-posts on the frontier at Cbumbi and Phakri, similar to that possessed by the Russians at Kiachta.

In the discussion which ensued on the reading of this paper, Lieut.-Gen. Sir H. THUILLIER spoke of the very great difficulties that the directors of the Indian Survey had had to overcome in order to obtain a knowledge of the topography of the routes between Bengal and Tibet—difficulties caused by the jealousy and unceasing vigilance of the Tibetan authorities. However, by training native explorers and sending them across the frontier in disguise, a large amount of useful information had been obtained.—Mr. HOBSON (Chairman of the Sheffield Chamber of Commerce) expressed the opinion that our trade with Tibet would remain on a small scale until better means of transit had been provided.—Mr. TRELAUNY SAUNDERS, on the other hand, believed that a better trade would have long ago sprung up if our authorities had adopted a right course. Tibet was a country which, from the earliest period of history, had been the greatest wool-producing region in the world, and the wool was of the finest quality. If our Government had put their agents into communication with the great flock-owners of the country, and made them sensible that, by bringing their wool to the foot of the mountains, they would find a constant and ready sale for it, the Tibetans would have brought it down. Instead of this, they had been content with a small peddling trade. In Tibet the sheep were beasts of burden, and a flock of 1200 sheep, each carrying from 30 to 50 lbs. may be brought down over difficult passes by six men and their dogs. In this way only could a large trade arise, for it was useless to talk of a large export of British manufactures to Tibet without providing a return trade to pay for them. As they put money into the pockets of the flock-owners, a demand would arise for such articles of consumption as the people required. He remarked, in conclusion, that Tibet was being approached by the Russians on the northern side, and it behoved us to do all that was possible to secure control over the trade and treasures of the country.

Geography of the Upper Course of the Brahmaputra. By C. E. D. BLACK.—The subject of this paper was the discovery of the bend of the Sanpo River and its connection with the Brahmaputra, by a native explorer, in 1877, described in our September number, p. 593.

In explaining the circumstance that native explorers were employed in making these important discoveries, Sir H. Thuillier said it was not physical but political difficulties which prevented Englishmen from venturing into these countries. English surveyors had planted their instruments at altitudes of 20,500 feet, and in one case at 21,500 feet, and were ready to encounter any physical obstacle whatever. The difficulties placed in their way by Governments were, however, so great, that they had been thrown back more than they could desire.

The recent Dutch Expedition to Central Sumatra. By Professor P. T. VETH.—The almost unknown area in Sumatra between the central mountain range and the eastern coast was explored in 1877–79, by a scientific party, under the auspices of the Dutch Geographical Society. The present paper summarising the results was read by Mr. D. D. Veth, son of the author, and one of the members

of the Expedition. The Expedition was divided into two parties, one of which entered from the west to explore the sources of the Batang-Hari and its tributaries; the other, under Lieutenant Schow Santvoort (who died shortly after), went up the river in a steam launch, from the east coast. The western party ascended several peaks, among others, Mount Karinchi, 11,820 feet. As an important result of the expedition may be mentioned the exploration of the great river Batang-Hari, which was found to be 210 miles in length, in a straight line, and upwards of 490 miles following the windings, larger, therefore, than the Musi, or Palembang, hitherto considered the chief stream of the island. The river was found navigable by small trading prahus, drawing $3\frac{1}{2}$ feet, for 370 miles.

Discovery of the Sources of the Chico in Southern Patagonia. By DON RAMON LISTA.—The author was sent in 1878 by the Buenos Ayres Government and the Sociedad Científica Argentina to explore Southern Patagonia. Having landed at Punta Arenas in the Straits of Magellan in March, and studied the mineral products of the locality, he set out in mid-August on his northward journey. After passing the Santa Cruz Valley, the exploration of the course of the Chico commenced, being the important part of the undertaking. At the end of September the confluence of the Shehuen and the Chico was reached, and the valley of the latter followed past the curious isolated basaltic rock Mawaish, to the confluence of a new river on the north side, named Belgrano by the traveller. On the 19th, a lake was discovered 4 miles long and 2 broad, fed by several streams. The valleys at the foot of the Cordillera were thickly clothed with woods of the fragrant, evergreen, antarctic beech of very large size and great age. Above these trees, at the extreme point reached, Señor Lista planted the flag of the Argentine Confederation. Having examined the two northern sources of the Chico, the southern one was also explored, and on October 30th the party returned eastward, reaching an encampment of friendly Tehuelches in the Shehuen Valley on November 6th. These Indians are divided into two great tribes, one inhabiting Northern Patagonia, between the Chupat and Limay, and the other wandering between the Chupat and the Straits of Magellan. These main divisions contain many smaller clans, under about ten chiefs. The large average stature of the Patagonians is in the main confirmed, the tallest man measured being 6 feet 4 inches. They are indolent and addicted to gambling, but very hospitable and kind, and with the chase as their only occupation. A collection of words now in use made by Señor Lista was found to agree very closely with those given by Pigafetta in 1520.

Friday, August 22nd.

The Basin of the Upper Zambesi. By Major SERPA PINTO.—The Zambesi, in the opinion of the author, was bound to play in future a most prominent part in the progress and development of Africa. When he struck its banks on his recent expedition across the continent it was not the first time that he had had dealings with this river; he had visited the Zambesi before. When quite a boy, he planted his foot for the first time on African soil precisely at the mouth of this river. No sooner had he landed than a fearful storm arose, and the vessel which had borne him was compelled to weigh anchor and put to sea. He found himself there with one companion, thus abandoned on the shore, where for four days they lived solely on crabs, and he had much to do to survive on this scanty diet. Shortly afterwards he was saved from death by fever near Senna. Later on he stood by the Zambesi close to Massangano, and saw its waters tinged with the blood of many of his comrades who fell in the hot encounter on that spot in November 1869. In the same place in the previous year there fell in the battle of Arnanha 2000 Portuguese subjects. It was through the Zambesi that the Portuguese in former centuries made their way

into the interior of Africa; and at Zumbo, 700 miles from the coast, there still exist the ruins of a missionary establishment, where the rudiments of civilisation had been imparted to the surrounding tribes. The Makololo of the Upper Zambesi valley had now disappeared completely. The Luinas now dominating there followed pastoral habits.

The PRESIDENT informed the meeting that during the whole of his journey across Africa, from Benguela to Natal, Major Pinto had taken astronomical observations day by day, even when suffering severely from the consequences of the severe privations he had to undergo. He had therefore proved himself to be not a mere traveller, but one of the most scientific of our African explorers.—Commander CAMERON acknowledged the journey of Major Pinto as one of the most important that had been made. He had not only mapped a great extent of new country, but fixed the positions along a large tract previously explored by Livingstone, but left unsurveyed by that great traveller. That the Portuguese were again to the front in the field of geographical discovery must be a source of congratulation to the whole world.

Basin of the Ogowé. By Lieutenant SAVORGNAN DE BRAZZA.—M. de Brazza, who was himself present, gave an account of his recent remarkable journey to the sources of the Ogowé River, and beyond into the basin of the Congo, a journey full of privations and dangers, extending over three years. An account of this journey has been already given in the 'Proceedings,' pp. 129 and 358.

Fourth Journey to the Southern Galla Country. By the Rev. THOMAS WAKEFIELD.—Mr. Wakefield described a journey he had made in 1877, from his mission station at Ribé, near Mombasa, to the Bararetta Gallas, who occupy the district lying between the rivers Tana and Sabaki. The course he took was the route leading along the maritime hilly range occupied by the Wanyika, an agricultural tribe of harmless, peaceful disposition, who are occasionally harassed by predatory visits from the marauding, pastoral Masai. Both Masai and Somali are largely given to cattle-lifting practices, on which occasions they also capture numbers of women and children whom they carry into slavery. The Wanyika country is chiefly undulating, well clothed with verdure and sprinkled with trees, with here and there a strip of forest. Mr. Wakefield reached Malindi on the 31st August, after a march of nine days. Thence he proceeded to the Galla districts of Sigirso and Kashé, lying in a west-north-westerly direction. At a conference with the prime minister of the chief, a Galla of commanding figure and noble disposition, named Gona, he was informed that the chief and people had consented to allow him to establish a mission in Sigirso. Availing himself of the permission then granted him to visit all parts of the country, he made various short excursions in this and the adjoining district of Kashé. He was surprised to find in the region a group of lakes. The first visited was called *Bilisa Sigirso*, a sheet of fresh water of curved shape, several hundred yards in width, the end of which he did not see. The northern and southern sides rise into steep wooded ridges, but at the ends are grassy slopes; it discharges its waters into the Sabaki, and abounds in hippopotami, crocodiles, and fish. The second lake, *Bilisa Kashé*, in the Kashé district, was about a mile and a half in length and width, the shore line forming a succession of large bays, and the waters beautified with white water-lilies, which here take the place of the purple-coloured species generally found in all fresh-water expanses in East Africa. There were two other lakes contiguous to this one, besides several smaller ones in the Sigirso district, and a large one at Jiloré, about half a day's journey further inland. The district of Sigirso is a slightly elevated plain, sinking into depressions where the lakes occur. It is very fertile, and judging from a three

months' residence in the wet season exceedingly healthy. A high forest-clad range of hills traverses the country from north to south, abounding in useful timber. In conclusion the author observed that the route marked as traversed by the German traveller, Brenner, from the Pokomo country through the Barareta Gallas, and along the southern bank of the Sabaki, is pure invention. The Gallas all assured him that no European had visited the region since he (Mr. Wakefield) was last there in 1865. On meeting afterwards at Zanzibar Dr. Fischer, a traveller who had just been to the Galla borders, Mr. Wakefield found that he had independently come to the same conclusion regarding Brenner's pretended journey.

German Explorations in Africa. By Professor ERMAN.—This was a résumé of recent explorations by German travellers in the African interior.

The Euphrates Valley Railway. By Commander V. L. CAMERON, R.N.—As the result of a personal examination of the ground he had recently made, the author, after reviewing nine of the routes that had been proposed, gave the reasons for his choice of a tenth. This would commence at Tripoli as the Mediterranean terminus, and thence the line would follow the country between the mountains and the sea till after passing the Nahr-el-Barid and Nahr-el-Kebir. It would then pass through them by the Wady Eyne-Soodie and Kara Chibok to the Bukeia, a small but very fertile plain nearly encircled by the Nahr-el-Kebir, and after about three miles of rather difficult work, there would be a gradual ascent to the plains around Homs. The route continues hence by Aleppo and Orfa to Mosul, by the valley of the Tigris to Bagdad; thence to Bushire, and in some future time through Baluchistan to Karachi.

In the discussion which followed, Sir Charles Nicholson opposed the scheme of railway proposed as impracticable, at least in a financial and commercial point of view. The Rev. Canon Rawlinson, on the other hand, believed that in view of the great importance to England of a railway connection with India, it could not be pronounced impossible.

On proposed Indo-Mediterranean Railway Routes, with an account of a recent Journey from Bagdad to Bushire. By WILFRED S. BLUNT.—The author had recently travelled the whole of the distance by land between the Mediterranean and the Persian Gulf, and gave his reasons for pronouncing the projects of a railway across the desert to be mere dreams. The only possible line would be one which should adhere pretty closely to the existing caravan road, passing through Orfa, Mardin, Nisibin, Mosul, and Kerkuk, and approaching Bagdad from the north. But in any case, nothing but the sternest political necessity would justify the extension of the railway beyond Bagdad, which is already in river communication with the sea. In order to show how little a line of route through the regions of the lower Tigris has to promise investors, the author gave a description of his own experiences during his journey (in company with his wife, Lady Anne Blunt) from Bagdad to Bushire, a distance of 500 miles, or about half of Commander Cameron's proposed route. The party travelled by way of Dizful and Shuster to Dilam on the Persian Gulf, and thence to Bushire. They crossed nine considerable rivers, and passed through three large towns and about a dozen villages. The people almost everywhere were inhospitable and wretchedly poor. About fifty miles of the route lay through well-cultivated districts, and fifty more through intermittent cultivation; the rest might fairly be described as an uninhabited desert.

(To be concluded in the November number.)

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—August 1st: M. DAUBRÉE in the Chair.—The deaths of two members were announced, M. A. Gréhan, late Consul-General in Paris for Siam, and M. Louis Favre, Superintendent of Works at the St. Gothard tunnel. The latter gentleman had taken an active part in the deliberations of the recent Inter-oceanic Canal Congress at Paris, and had given his vote for the Panamá line.—Admiral de la Roncière le Noury announced that he had memorialised the Municipal Council requesting that the name of René Caillé might be given to one of the streets of Paris. He considered this honour to the memory of Caillé would at the present time be most opportune, inasmuch as the project of a railway to connect Algiers with Senegal and the Niger was being discussed by the Chamber. England was endeavouring to construct a road in Eastern Africa, and it behoved France to follow her example in opening up the interior of the continent, and thus contribute its share towards the enfranchisement of the negro race by the substitution of legitimate commerce for the slave traffic. Admiral de la Roncière also announced that M. de Lesseps had been named Honorary President of the Society by vote of Council.—Major Serpa Pinto read a paper on the tribes met with during his journey across Africa. He said the greater part were of docile and gentle dispositions, and the countries they inhabited healthy and adapted to the rearing of cattle. These countries would be readily accessible to civilising influences if advantage were taken of the great fluvial highways. Major Pinto submitted his notes, maps, and records of astronomical observations made during his journey. At the conclusion of his paper, the President, in thanking the author, announced that the Cross of the Legion of Honour had been granted to him by the French Government, in recognition of his admirable exploration.—A paper was then read, "On his recent Journey to Segou-Sikoro," by M. Paul Soleillet. The author said he had been delighted on his return to learn that the French Government was actively occupied in considering the construction of a Trans-Saharan Railway, and he had furnished the official commission nominated for this purpose with all the information in his power. In a former journey he had penetrated as far as the oasis In-Salah, and had surveyed a part of the route best adapted for the railway. On this side the line would meet with few difficulties, and as regards the route from the Senegal to the Niger, the country was still easier for the construction of a railway; for it is level, fertile, and inhabited solely by two races, the Bambara and the Solenké. Nothing would be easier than the establishment of a preliminary trade-road between the two rivers; it would suffice to mark out a straight line and clear it of bushes, to enable a bullock-draw to travel for 200 or 300 miles. The country thus traversed would immediately furnish a considerable amount of trade produce, among others a kind of vegetable wax which can be reduced to oil, and made to serve many useful purposes in the arts.

NEW BOOKS.

(By E. C. RYE, *Librarian R.G.S.*)

ASIA.

Finsch, O.—Reise nach West-Siberien im Jahre 1876. Auf Veranstaltung des Vereins für die Deutsche Nordpolarfahrt in Bremen unternommen mit Dr. A. E. Brehm und Karl Graf v. Waldburg-Zeil-Trauchburg. Berlin (Wallroth): 1879, 2 vols., 8vo., pp. 663, pls., maps. (*Asher.*)

These volumes contain the detailed account of the expedition to West Siberia sent out by the German North Polar Exploration Society (now the

Bremeu Geographical Society) in 1876, and of which the chief results have already appeared in the publications of that body. The line pursued was from Bremen via St. Petersburg, Moscow, and Kasan to Ekaterinburg, over the Ischim Steppe to Omsk, along the Irtisch to Semipalatinsk, and thence as far south as Sassyk-Ala-Kul. From that point, after various excursions in the Dsungarian-Ala-Tau, over Tarbagatai, Nor-Saissan, and the Chinese Altai, the River Ob was followed to Obdorsk, where the Tundra was crossed to the Kara Sea, the return to Bremen being made via Tobolsk. The maps are a general outline (by Petermann), route-maps of the portion traversed of the Chinese province Ili-Tarbagatai, and of the road from Saissan along the Kara Irtisch to Saissan-Nor, following and partly within the Chinese boundary line to Marka-Kul, and north to Altaiska Staniza, and a map of the region between the mouth of the Ob and the bay of Kara (scale 1 : 1,000,000),—the last three by Count Waldburg-Zeil. Special attention is given to ethnographical subjects, more particularly as to the Kirghise, Ostiaks, and Samoieds, of whom characteristic portraits from photographs are given, with many other illustrations of the most important physical features of the regions visited (some also from photographs), and their inhabitants, &c. The natural and economic products, distribution of flora and fauna, and climatic conditions, also receive due attention, the result being a most valuable accumulation of material, available both for the purposes of science and commerce.

Méjow, V. J.—*Recueil du Turkestan; comprenant des livres et des articles sur l'Asie Centrale en général, et la Province du Turkestan en particulier.* Composé sous les auspices du Général Gouverneur du Turkestan, K. P. von Kaufmann. Tomes 1-150. *L'Indicateur systématique et alphabétique.* St. Petersburg: 1878, sm. folio, pp. 184. (*Dulaeu*.)

The author has, during the last ten years, accumulated upwards of 3000 works and articles relative to Central Asia, forming 200 volumes, and he now publishes an alphabetical and systematic Index to the first 150 of these, giving the titles, places of publication, and dates of the separate treatises (2007 in number). The majority are in Russian.

Statkowski, B.—*Problèmes de la Climatologie du Caucase.* Paris (Gauthier-Villars): 1879, 8vo., pp. 284. (*Williams & Norgate*.)

This work, translated from the original Russian, is the result of investigations by the author, a Russian Engineer, preliminary to the construction of a projected railway to join Tiflis to the Rostow-Vladikavkaz line. A comparison is made between the climate of the Caucasus and that of Switzerland, and material is got together from various sources with the object of proving that the mortality of the former is less than in the rest of Russia and is diminishing.

AMERICA.

Bodham-Whetham, J. W.—*Roraima and British Guiana, with a glance at Bermuda, the West Indies, and the Spanish Main.* London (Hurst & Blackett): 1879, 8vo., pp. 363, map, pl.

The record of a journey undertaken with the unfulfilled object of ascending Roraima, containing many observations of interest upon the physical geography, natural history, and botany of the regions traversed. An appendix contains a reprint of some articles by Marmol, upon the Venezuelan national boundaries with British Guiana. A map (by Stanford), scale 40 miles to the inch, shows the author's route from the mouth of the Essequibo up the Mazaruni to Masanassa, from which point he ascended the Curipung, striking the Mazaruni again further south on his way to the inaccessible mountain.

Moreno, Francisco P.—*Viaje á la Patagonia Austral, emprendido bajo los Auspicios del Gobierno Nacional, 1876-1877. Tomo primero.* Buenos Aires (Jacobsen): 1879, large 8vo., pp. 460, map, illustrations. (*Dulaeu*.)

The author, director of the Anthropological and Archæological Museum of Buenos Aires, and head of the Commission for the exploration of the southern

territories of the Argentine States, undertaken by the National Government in the years mentioned in the title, has been hitherto prevented by an illness contracted during the voyage from publishing the account now given to the world. A second volume, in course of preparation, will contain the scientific results, with descriptions of the collections of archaeological and ethnographical material, to which Dr. Moreno's attention was naturally especially directed.

The present volume, after some introductory observations upon the author's visit to Santa Cruz in company with Dr. Berg at the end of 1874, and of his subsequent excursion to Northern Patagonia, which will be hereafter discussed in detail, and has been given in abstract in the *Annals of the Argentine Scientific Society*, gives somewhat in diary form the particulars of the more important official journey, which was commenced on 20th of October, 1876, in the ship *Santa Cruz*. The Chubut was reached on November 14th, and the author believes with Wickham that this river is the Camarones of D'Anville. An account is given of the condition of the Welsh colony at Tre-Rawson and Gaiman (700 inhabitants, in 120 houses, extending over 20 miles), followed by descriptions of the hydrographic system, geology, climate, flora, and fauna of the Chubut region, and of investigations of Indian tombs, &c., with various interesting episodes illustrative of native customs. Puerto Deseado (with a visit to the interior), the bay of Santa Cruz, Isla Pavon, the two Salinas, and Isla de Leones are then described, with the ascent of the Chico to its junction with the Sheuen, and of the latter river to Sheuen-Aiken. Then comes the most important portion of the work—the ascent of the Santa Cruz river to its source at the foot of the Cordillera in the Argentine Lake, on the greater part of which the author sailed, investigating also its southern side in an excursion round Mount Frias to the foot of Mount Buenos Aires, the most westerly point reached. From the Argentine Lake he struck northwards to the Sheuen, which was reached above Sheuen-Aiken, and again reached the eastern slope of the Andes by the southern sides of Lakes Tar and St. Martin, turning south from the former of these to the great Lake Viedma, of which the eastern shore was explored to its connection with the Argentine Lake by the River Leona. This portion of the work contains a Tehuelche vocabulary, and it concludes with the descent of the Santa Cruz and the subsequent visit to Punta Arenas in the south.

The illustrations are roughly executed, but evidently faithful, some being large, and one, Lake Viedma, in colours; the map (25 miles to the inch) shows the whole course of the Sheuen (with the lower part of the Chico) and Santa Cruz rivers, as well as the lake-system.

Peacock, G.—Notes on the Isthmus of Panama and Darien, also on the River St. Juan, Lakes of Nicaragua, &c., with reference to a Railroad and Canal for joining the Atlantic and Pacific Oceans, with original maps and Plans. Exeter (Pollard): 1879, 8vo., pp. 96.

Captain Peacock claims to have been one of the earliest explorers and surveyors of the present century in the Isthmus of Panama, having crossed it five times from 1831 to 1842. His routes by rail and canal, proposed (but apparently not published) some forty-eight years ago, practically agree with the present Panama railroad and the line of canal selected by the recent International Congress.

The author's survey of Greytown in 1831 and his plan of the entrance of the Rio Grande (with insets of Limon or Navy Bay) are also added.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Notes on the Topography of the Sierra Nevada of Santa Marta,
U.S. of Colombia. By F. A. A. SIMONS.**

Map, p. 752.

IN the course of his explorations, as naturalist, of the isolated mountain mass of the Sierra Nevada, in Colombia, mention of which was made in the February number of the 'Proceedings,' Mr. Simons has utilised the opportunities he has enjoyed by making a route-survey of his various journeys and noting the topography of the region, regarding which very little was accurately known. On his arrival on the coast from England in January 1878, he landed at the port of Rio Hacha, from which place he travelled inland in a southerly direction to Valle Dupar, making this town the starting-point for his excursions in different directions. On his first attempt to ascend the Sierra, via the Indian village of San Sebastian, he did not succeed in reaching the summit, but on a second occasion, in July 1878, he was more fortunate; he then crossed by a pass between the snowy peaks, and descended the northern slopes to the Caribbean Sea. These and other routes taken by Mr. Simons are depicted on the map which he has sent to illustrate these notes.

Santa Marta, the capital of the State of Magdalena in which the Sierra Nevada is situated, is a town of 3000 inhabitants, the residence of the President, and the seat of a bishop; it has well-built houses and good streets, but an almost ruined commerce; the latter has all gone to the modern port of Barranquilla, within the mouth of the River Magdalena, and the possession of the finest harbour on the coast has been of no avail.

Two miles to the north is the small fishing village of *Taganga*, containing 100 inhabitants, chiefly of the Indian race; it stands on a small bay surrounded by hills, and is without water, so the latter

* Mr. Simons obtained his first experience as a traveller on the Zambesi and Lake Nyassa, having accompanied Mr. Cotterill, as assistant, in his expedition to Nyassa in 1876.

has to be carried over a steep hill by donkeys, from the Rio Manzanares, or brought in canoes from the mouth of the same river. *Mamatoco* is another small village on the River Manzanares, about six miles from the town. Both this and Taganga have pretty churches. Further up the Manzanares is *Bonda*; this village has a flourishing trade in earthenware, with which it supplies the whole State: it has 200 inhabitants and is in a very dilapidated condition; the once fine church is a heap of ruins. *Masinga* is another small village (it was nearly burnt out last year, only four houses remaining); its chief industry is sugar and maize. The *River Manzanares* is a small mountain stream, coming down from the western slopes of the San Lorenzo Hills, which are connected with a north-westerly spur of the Sierra Nevada; it boasts a bridge, on the road from Santa Marta to La Ciénaga, the only bridge in the whole State.

This latter town, *San Juan de la Ciénaga*, known here as "Ciénaga," is the largest in the State; it is a conglomeration of tumble-down thatched huts, with about 7000 inhabitants, and is the hotbed of revolution and disturbance. It is about 22 miles from Santa Marta, over a very bad road. The road, or rather mule track, passes through *Gaira*, a pretty little country town of 500 inhabitants, with a port, situated on a small mountain stream of the same name. Within a mile of La Ciénaga is the dirty little fishing village of *Pueblo Viejo*, containing 200 inhabitants. Between Santa Marta and La Ciénaga there is telegraphic communication; the line was to have been continued to Barranquilla, but although the posts have been planted, lack of funds has prevented them from being supplied with a wire. At *Rio Frio*, 10 miles from Ciénaga, a settlement has been started within the last three years, and is rapidly increasing; the chief industry is tobacco. Several haciendas along the Arihueca, Sevilla, Turinca, and La Fundacion, rivers flowing into the Ciénaga Grande from the slopes of the Sierra Nevada, are started every year, as the ground is specially adapted for cacao, tobacco, and plantains. In the mountains, on the northern side of the Arihueca, several vain attempts have been made to discover "Posihueca," the former capital of the Tairona Indians, where large deposits of gold are supposed to exist. The dense virgin forest about here makes penetration impossible.

Rio Hacha is a small town of 2500 inhabitants, but like all other places in this unfortunate State, it is completely ruined by revolutions; it carries on a brisk though small and perilous trade with the Goajira Indians, exchanging rum and European goods for skins and other articles. The road into the interior, or the Provinces, as the various towns are collectively called, is in a shamefully neglected condition, considering the amount of trade, which consists chiefly in brazilwood, coffee, and sugar. The town was originally built on the banks of the Rio de la Hacha, but this river has found a new way into the sea, and now runs more than a mile from the town. The name of

the river has been changed, and it is now called Rio Calancala; it forms the boundary of the "National Goajira Territory," and is navigable for small craft and boats far into the interior, but on account of the war-like character of the Indians few attempts have been made to utilise this channel. *Barbacoa*, a few huts on the road to the Provinces, is a general halting-place; it is usually very busy. *Treinta* is a small decayed village of about 100 inhabitants; judging from the ruins it must have been once very extensive. After fording the Rio Rancheria, the path goes direct to San Juan, although many prefer taking the longer way through Fonseca.

San Juan de Cesar, on account of its central position, has some little commerce. It is a town similar to Rio Hacha, of about 1500 inhabitants. Within an hour's ride is the newly-formed town of Villa Nueva, containing 1000 inhabitants, with a growing trade in coffee, which is already becoming important. About 10 miles from San Juan is the pretty little town of *Fonseca*, of about 600 inhabitants, with a small trade in sugar and rum. Six miles further to the north-east is Barrancas, once a village of considerable importance, but consisting now of only a few huts with about 200 inhabitants; it carries on a small trade in a peculiar kind of worked hammock and rum, which are passed into the Goajira territory by way of Soldado. South of San Juan a small mountain village, *Patilla*, is springing up, with a large trade in cheese, cattle, &c. As yet it is only a collection of farms, but they are fast closing into a town. *Badilla*, half-way between San Juan and Valle Dupar, is the mere skeleton of a once populous village.

Valle Dupar, once a large town of fine houses with balconies, four churches, &c., has, through the revolutions of 1860-63, 1867, 1875, and 1876, fallen step by step, till now it scarcely musters 1000 inhabitants, and is one mass of ruins. It is beautifully situated, 700 feet above the sea-level, on the banks of the Guatapurí, and surrounded by gardens. On the north-west the snowy regions of the Nevada are plainly visible, while on the east and south-east the wooded slopes of the Andes rise like a wall. It is entirely free from mosquitoes and sandflies, and although during certain months not very healthy it is a most desirable residence, on account of the numerous small mountain villages within a few hours' walk—*La Paz*, for example, on the other bank of the Rio Cesar, which is navigable from here into the Magdalena, and thence down to the Caribbean Sea. *La Paz* has a brisk business in sugar and plantains. It is rather a dirty little place of about 500 inhabitants.

National Territories of the Nevada and Motilones.—The portion of the Sierra Nevada inhabited by the Arhuacos Indians, and the portion of the Andes occupied by the Motilones, were ceded to the natives by the State of Magdalena, and form a separate system of government worked direct from Bogotá, with a separate Prefect, and a whole train

of officials paid out of the national treasury. The Motilones territory, situated east of the lower course of the Rio Cesar, I have not visited, but know that it consists of only three villages, viz. Espiritu Santo, Palmira, and Jobo. The Nevada reservation (enclosed by a dotted line on the accompanying map) is subdivided into six "corregimientos," each with its corregidor and public school. These subdivisions are as follows:—

1. *Atanquez*, the capital and seat of justice for all the Indians, lies 2800 feet above the sea-level, has about 800 inhabitants, chiefly Indians, and does a large trade in maguey, which is the fibre of an aloe, made into hammocks, bags, ropes, &c. It is six hours' journey from Valle Dupar, and eight hours from San Juan. *San José*, a new Indian village, built in 1874 by order of the Government, on the banks of the Guatapurí, at an elevation of 5000 feet, is wholly composed of Indians, about 120 in number.

2. *San Sebastian de Rábago*, and the hamlet of *Pueblo Viejo*. San Sebastian is a beautiful little Indian village, of 700 inhabitants, surrounded by a wall, and lies in a valley on the banks of the Rio de la Fundacion, 6700 feet above sea-level. With a climate cool enough to grow wheat and other products of temperate regions, and unlimited water power, it will some day more than likely become an important place through immigration, as it is well adapted for Europeans. San Sebastian is the most convenient point for reaching the snowy elevations of the Nevada, which are only one day's march distant. On my first ascent I reached from here an elevation of 17,000 feet, this being the foot of the large field of snow that covers the highest point, and examined the sources of the Aracataca, one of the principal rivers that flow into the Ciénaga Grande. The Aracataca drains the whole southern portion of the snowy range, the white peaks of which run true east and west. It has three principal heads, all flowing out of small lakes. The most important lies at the foot of the highest point, at an altitude of 14,000 feet, and after a short run southwards, takes an abrupt curve to the west, where it is joined by two other smaller branches: although not two miles from the fountain head, it has here fallen 3000 feet, and become so large that the slightest rainfall makes it unfordable. The drainage of the northern side of the snowy peaks is carried away by the Guatapurí, which I also had the pleasure of following to its source. Like the Aracataca, it also springs from several lakes, 13,000 feet above sea-level; these are five in number, one above the other, each having a fall of about 100 feet. The valley of the Guatapurí, falling from 11,000 feet to 700 feet, has a varied climate, and is peopled by Indians, the few straggling huts of whom are seen almost throughout its whole length. No less than three Indian bridges span the river. The chief commerce here, as at San Sebastian, is in onions, potatoes, and maguey. The Indian track between San Sebastian and Atanquez is very heavy walking, owing to the steep ascents. Nearly all along the road are Indian

huts and plantations, especially at *Templado*, where large quantities of "hallo" or coca (*Erythroxylon coca*) are grown, and sent to the Goajira. While crossing this road I was shown the celebrated valley of Tairona, supposed to be filled with gold and emeralds. The only wooded portion in the Nevada is *Chinchicua*, a splendid mountain mass about 11,000 feet in height, which intercepts and condenses all the clouds coming from the north-east; so that it is eternally raining in this place. A cinchona is pretty abundant here, but it is a poor variety.

3. *Rosario*, a quiet little village, six hours' march from San Juan, of 100 inhabitants.

4. *Marocaso*, 2000 feet above sea-level, another quiet village of about 150 inhabitants, a day's march from San Juan, on the banks of the Raneheria.

5 and 6. *San Miguel* and *Santa Cruz* (forming the 5th corregimiento), and *San Antonio* with *Santa Rosa* (the 6th). These two corregimientos lie on the northern flank of the Nevada, and are best reached from the sea. When I crossed the Nevada, I ascended from Ataquez, with Indian guides engaged at San José, and took three days crossing the formidable pass or "paramo" de *Chirugua*, at an elevation of 16,000 feet. A valley lies between this and the snowy range (*vide Map*), having an elevation of 14,000 feet. Numerous small streams flowing down the steep slopes of *Chirugua* collect at the bottom to form the Rio San Miguel, which, united with the Rio of San Antonio, forms the Rio Ancha. *Macotoma* is a hamlet of only a few Indian huts, at an elevation of 11,000 feet. *San Miguel* is a large and important village, entirely Indian, its population about 400. Lower down the river the new village of *Santa Cruz*, containing 100 inhabitants, and *Santa Rosa*, lying a little off the road, with 100 inhabitants, 3500 feet above sea-level, were founded in 1875 by the Indians of Palomino, who wished to establish themselves nearer the civilised European towns. *San Antonio*, population 300, is another of these settlements, built 3700 feet above the sea-level. Two miles from this place is the wooded mountain of *Chirua*, sacred among the Indians, and also said to hold immense treasures. All these villages are infested with the chigoe (nigua) and a worm that buries in the flesh. The road down to the sea-coast is very bad and dangerous in places.

Other settlements on the coast are:—

Dibulla.—A small seaport on the river of the same name: the place is now a mass of ruins, and, after San Juan de la Ciénaga, the worst and most dangerous village in the State. Close by is a small hamlet called Punto de los Remedios; the overland road to Rio Hacha is about 36 miles, and rather difficult on account of the Rio Enea, which is very swift, deep, and hard to ford, besides being infested by the most ferocious caimans known along the whole coast.

Camaronés (or "shrimps"), is a flourishing village of 300 to 400 inhabitants, situated four miles up the river called after it. The remains of

a hut on the sea-shore, at its mouth, bears the title of Guasimo, seaport of Camarones.

Between Dibulla and Santa Marta there are no settlements, or even houses, on or near the sea-coast, till Bonda is reached, a distance of about 50 miles; the journey is one of two or three days, and difficult on account of the large number of rivers to be crossed. The Don Diego is the worst. On the rivers Buritaca, Goachaca and Mininguaca, several plantations were formerly started, but all have been abandoned, partly because of the insupportable plague of ticks and flies, and partly through the commercial decline of Santa Marta.

Rio Naranjo I have not marked on the accompanying map, not knowing its position; just before reaching Bonda the track passes, it seven times.

The Exploration of Oregon in 1878 by the Wheeler Survey.

By J. W. GOAD, F.R.G.S., Member of the Survey Party.

My endeavour in this paper will be to give a general outline of the work of Lieutenant Wheeler's Survey Expedition in Oregon in the summer of 1878.

Independently of the first or Californian section, the Expedition was divided into eight field parties, besides three main astronomical parties, distributed in the following political divisions: California, Oregon, Nevada, Washington Territory, Utah, Colorado, New Mexico, Texas, and Arizona.

Leaving the Central Pacific Railway at Reno, we travelled northward to Fort Bidwell, our rendezvous, by a route lying near the boundary line between Nevada and California. Arriving at the Fort, which is situated on the borders of Oregon, our party was soon organised. Lieutenant Thos. W. Symons, of the U.S. Engineers, was placed in command. The naturalist of the party, Mr. H. W. Henshaw, was to accompany us during a portion of the field season, and with the topographical assistants the corps was complete. Ben French, an old pioneer of the Far West, accompanied us as chief packer. Our party in all amounted to eleven men, with thirty-six mules for transport of baggage. A full complement of sextants, transits, cistern barometers, Cassella's aneroid barometers, &c., was furnished.

One of the objects of the Expedition was to make a complete reconnaissance of the Cascade Mountains, and a survey of the area embraced between the Cascades and the 119th meridian, also the country lying between the Columbia River and the boundary line of Oregon and California. From Camp Bidwell a circuitous route was to be taken to Fort Klamath, where Lieutenant Wheeler was to meet our party and give detailed instructions. Our course was northward for the first few

days, over an elevated plateau 4000 feet above the sea, covered with sage-bush, sterile and treeless, with here and there low ridges and ravines. It was a scene of complete desolation, the country forming part of what is known as the Oregon Desert, which extends as far north as the 44th parallel. The volcanic character of the country, and its forbidding nature generally, render it unfit to support a civilised population.

Long and tedious marches brought us to the head of Lake Abert, an alkali lake of considerable area. The shore was sandy and saline, covered with a white, powdery alkali. At this place we narrowly escaped falling into the hands of the Indians, who it seems were committing depredations all around, and only reached this point a few hours after ourselves. With the large amount of baggage belonging to the party, we should have been a tempting prize for these well-armed redskins. Prepared to some extent for such an emergency, and especially careful in keeping our arms in good order, we should have been able to offer some resistance, but could not have held out long against Sagan's powerful band of Bannacks.*

From Lake Abert we travelled westward, entering Chewancan and Summer Lake valleys. Chewancan Marsh is about 3000 feet above the level of the sea, and is a partly submerged prairie. Summer Valley is lower than Chewancan, and although distant only a few miles, has a markedly different temperature in winter. In the latter place snow sometimes falls to the depth of two to three feet, while at Summer Lake, almost 300 feet lower, the ground is scarcely covered. It was here that General Frémont, the early explorer, passed a winter, and in his extremity was forced to abandon his only howitzer. The water in the lake is extremely unpalatable, being impregnated, I believe, with borax and sulphur.

To the west, a crescent-shaped range of mountains rises sharply from the lowlands. The passage of this rim-rock was so steep that the ascent seemed impossible, and it was with much difficulty our mules were made to wind up the precipitous sides, and gain the gradual slope that descended westward.

Sikan Marsh is a miry prairie covered with coarse grass, and submerged in spring. A beautiful stream meanders through it, which we found to be filled with large trout. Hence we traversed a broken "mesa" country, well timbered, and reached the Sprague and Williamson rivers, flowing into the Klamath Valley—limpid streams, stocked with trout. There are two Klamath Lakes; between them is a ridge of lava rock, which makes the water of the Upper Klamath Lake a good deal higher than that of the Lower. These lakes repeat nearly the same typical features, and undoubtedly belong to portions of that same great plateau, known as the Great Basin; they are drained by the Klamath

* A branch of the Kliketat tribe.—Ed.

River, which, in the greater portion of its course, flows through a sterile country cut up by cañons, and breaks through the mountains near Shasta Butte, emptying eventually into the Pacific Ocean. Fort Klamath, in the Indian Reservation of that name, is an important post. It was here that the noted Captain Jack, and three others of the Modoc chiefs, expiated their crimes and treachery. The scaffold on which they were hanged still stands, a significant warning to such Indians as may meditate future massacres of the whites.

On our arrival at the Fort, Lieutenant Wheeler divided our party into two sections. Lieutenant Symons and five others, including myself, were detailed to occupy mountain peaks, and carry the triangulation to the north. Lieutenant Wheeler, taking charge of the remainder, proposed to examine the country along the base of the Cascades, which extend almost in an unbroken range from 42° N. latitude far into British Columbia. The mountain system of California and Oregon presents a natural wall parallel to the Pacific Coast, and distant from it about 150 or 200 miles. The east side of this range breaks off abruptly, while on the west the range slopes gradually down to the Willamette Valley.

The most important peaks of the Oregon Cascades are Mounts Pitt, Scott, Minerva, Thielson, Diamond Peak, the Three Sisters, Mounts Washington, Jefferson, and Hood. These peaks mark the line of fracture of the earth's crust. Mount Pitt is a symmetrical cone of volcanic rock, rising about 4000 feet above the level of the surrounding country. Our first attempt to reach the mountain was unsuccessful, the lava and fallen timber proving impassable barriers. Subsequently, by taking another route, we were with great exertion able to reach the base; the boulders and rock-slides were painfully difficult to get over, but as duty made the occupation of the peak imperative, we had to proceed. Mr. Symons, while in advance, nearly lost his life by a rock-slide, and to us all the ascent proved one of extreme danger. Rock-slides were very frequent. These are of broken lava-rock, and are retained in position by some unseen projection of the mountain, awaiting only the removal of a stone, or the slight additional weight of a man, to cause the whole mass to be set in motion. Once started, these slides go thundering down the slope, their velocity increasing with the distance, and carry everything before them. The altitude of Mount Pitt was found to be about 10,000 feet above the level of the sea. It may be mentioned that, in Oregon, the height of perpetual snow is from 7000 to 8000 feet. From here we saw Shasta Butte, in California (approximately 14,400 feet high), in all its grandeur.

To the north, mountains beyond mountains loomed up as one mass, without apparent regularity or shape; but close scrutiny reveals a system of ranges perpendicular to the line of sight. To the east, Klamath Lakes could be seen with their blue waters and bright green

reeds, while immediately beneath us were displayed several smaller sheets of water, surrounded by heavy timber.

Mount Scott is a wooded dome about 7700 feet high; here we found Indian watchtowers that had been recently occupied. Minerva Peak, north of Mount Scott, has a flat summit, and is probably 8000 feet high.

The next peak we ascended was south-west of the intersection of the 43rd parallel and 122nd meridian, its altitude approximately 9500 feet. On the east side the pumice stone made the ascent easy, while on the west, the face of the mountain is almost vertical. From this peak we had a view of Crater Lake, which lay about three miles to the west, and about 3000 feet beneath us—a vast body of water surrounded by vertical cliffs from 1000 to 2000 feet high. The area of this extinct volcanic crater is about 50 square miles; in shape it is circular. I myself had not unfortunately the opportunity of visiting the brink. By actual measurement it was found, that where the descent to the water's edge was practicable, which it is said to be but in two places, the height of the crater-walls was 1000 feet. Quantities of pumice in small fragments were found floating in the clear water. A small island, in the shape of a truncated cone, the sides of which were covered with red scoriæ, appears near the western shore. Obsidian was found in quantities, and the general indications give proof of the comparatively recent date of volcanic action in this place. I had the advantage of seeing this weird crater pool when the moon was at its brightest, and shall never forget the scene afforded by the light of the silver waters contrasting with the black gloom of the surroundings. It is sometimes, very appropriately, called *Mystic Lake*. East of this was a nearly level plain, covered with pulverised pumice, being the divide between the Klamath Lake and the head waters of the Deschutes.

Continuing our journey northward we pass Mount Thielson, a huge pile of rock rising perhaps 2000 feet above a broken country and resembling an immense sugar loaf. Its altitude above the sea-level, by angles of elevation and depression, was found to be 9280 feet.

The next point visited was Diamond Peak, a mountain composed of vesicular trap. On the western slope is an immense excavation, retaining always masses of snow. Snow-banks are also present on the north and south sides, and are from 70 to 80 feet thick. We obtained a closer acquaintance with these near the summit, as we passed through a tunnel of frozen snow. From Diamond Peak (altitude 9700 feet) innumerable small lakes were seen, while to the west and north mountains of great bulk stood out in eccentric outline.

Much to our regret we found it was a practical impossibility to continue our work on the crest of the mountains. Dense forests and tangled masses of underbush formed almost impenetrable obstacles, while our mules, encumbered with their heavy packs, were unable to jump over or pass under the fallen trees. Six miles a day were all we could

accomplish in traversing this jungle, and as our destination was the far distant Columbia River, we were compelled to give up the attempt to penetrate the labyrinth. I may refer here to the inconvenience we suffered in our triangulation from the smoke and haziness of the atmosphere, which at times was so dense as to compel cessation of work. The woods were constantly on fire, having either been lit by the Indians or ignited by natural agencies. Indians sometimes use this means of driving game into the open, when a cordon is made and hundreds of deer and other game are killed. Thousands of acres of huge pines, spruces, firs, with the heavy undergrowth, are ablaze at one time, and when the oxygen is completely consumed in the woods, the gases arise and combining with the oxygen in the outer air, cause a sheet of flame, miles in length, and from 100 to 500 feet high. Yellow pine is the characteristic tree on the east side of the Cascades, although other species are found.

Passing around Lake Odell, a large sheet of water about 17 miles long and four wide, we struck the western branch of the Deschutes. To our surprise, we found this river emptying itself into a lake from which there was no visible outlet; huge masses of lava were piled one upon the other on the opposite side in picturesque confusion. We found, however, that the Deschutes percolated under this mass, and reappeared about 10 miles to the north of the lake. Tracing the Deschutes in all its branches, we passed numerous cascades and rapids, and travelled through rich bottoms covered with wood and grass, where stock would find ample shelter from the snow and freezing winds of winter. Bountiful springs add to the volume of this rapid and turbulent river. At its junction with the east fork, the Deschutes is probably 600 feet wide and about five feet deep, with a velocity of about six miles an hour. Of course it can never be navigable.

At Crooked River we met Lieutenant Wheeler, and heard of his successful reconnaissances. Separating once more from the main party, our next objective point was Mount Jefferson. At the Warm Spring Indian Agency we obtained a guide, an old warrior, as we afterwards found out. That night we pitched camp in a drenching rain. Around the fitful gleam of the camp fire we heard this Indian's stories of his own prowess and cruelty to his victims. The storm continued throughout the night and next day, making it useless to attempt to scale Mount Jefferson, its battlements, turrets, and rugged precipices being cloaked with new snow. It was, besides, too late in the season, it being the 28th of September, and we were obliged unwillingly to retrace our steps.

Seven miles from the Agency, on the main road to the Dalles of the Columbia, are some warm springs, to which there are numerous and well travelled Indian trails. The springs are enclosed in a narrow cañon of bare red cliffs, from 100 to 200 feet high. Unlike others of a similar kind, the flow of the water is not great, the orifices and cavities through

which it passes being small. We had no thermometer suitable for registering the very high temperature of these springs. The streams flowing from them collect in ponds about 20 feet in diameter, and eventually find their way into the adjacent Warm Spring River, giving it its name. The rocks in these basins are impregnated with some mineral substance of a green colour, which is seen floating on the water. Several wigwams of Warm Spring Indians were located on the opposite side of the cañon, and men, women and children were amusing themselves in the tepid water. The October air felt to us decidedly cold, but the natives seemed wholly unconscious of the fact.

From the Warm Springs we entered Tygh Valley, a grassy plain dotted with juniper trees, about 2500 feet above the level of the sea. Bounded on the north with grass-covered hills, on the east by the enormous cañon of the Deschutes, its western border flanked by heavy timber, it affords a fine view of the snow-capped Mount Hood, towering high above the drifting clouds which generally hide its peak rising to a height of 12,000 feet above the level of the sea.

From Mr. Walker of the Warm Spring Agency some interesting facts were obtained regarding Mount Hood, which he, with two comrades, had ascended two years previously. High up the mountain side, far above the line of snow, there are craters from which hot steam issues. Five hundred feet from the top of the mountain is a large basin, on the west side of which lies the main crater: this gives out smoke and steam, and the smell arising from it much resembles sulphur. On the south-east side of the mountain there are also craters and huge glaciers. It was a great disappointment to our party to be obliged to forego the ascent of Mount Hood, but during the coming season I hope some members of the Expedition will occupy its highest pinnacles.

White River, on the north side of Tygh Valley, has its source in Mount Hood, and empties itself into the Deschutes. The milky colour of its waters is caused by some sediment brought down from the mountain, and held in suspension. This sediment, which appears to be pulverised pumice, is washed far down the Columbia, and is deposited on its shores, forming dunes by the action of the wind.

The falls of White River are grand, the water having a descent, in a distance of 200 yards, of 180 feet. Looking up the cañon we saw the water rushing madly over the precipice and closing the narrow vista, Mount Hood looking down in all its majesty.

The town of Dalles on the Columbia is an important place. Business is brisk and the stores are well stocked with first-class goods. A base line was measured, and a series of well-conditioned triangles was extended into Washington Territory. The astronomical station had been previously established by Professor Clark, assisted by Mr. George M. Dunn.

Quoting from the excellent description of Lieutenant Williamson:—

"The Dalles of the Columbia are formed by a bed of trap, through which the stream cuts in deep and narrow channels. Directly opposite the town, the north bank of the river presents the mural edge of a layer of trap, which is partially columnar and continuous. A little above this the river rushes through a chasm only about 200 feet wide, with vertical basaltic sides rising from 20 to 30 feet above the water. Steep hills closely border the chasm, leaving in some places scarcely room on the terrace to pass on horseback. The water rushes through this basaltic trough with such violence that it is always dangerous, and in some stages of the water impossible for a boat to pass down. This place is a favourite fishing resort of the Indians, and great quantities of salmon are caught by them."

The attention of the traveller is more especially directed to the salmon fisheries in the Columbia River, inasmuch as this industry would appear from all accounts to be very thriving, and increasing in importance every year. The method of catching the fish is either with nets, traps, or they are speared as they ascend the river from the ocean in prodigious quantities, and the operation is performed at night owing to the timidity or wariness of the fish. They are then salted, packed in barrels, and sent off to Europe where the demand for this article of commerce is great. The establishments for preserving, curing, and packing the fish have greatly augmented in number since their first introduction in 1866, in order to meet the enhanced requirements of the trade. A "Fish Propagation Society" has erected a hatchery on the Clackamas River for re-stocking and keeping up the supply of salmon on the Columbia River. This hatching establishment has capacity and facilities for hatching 6,000,000 salmon every year, and can double that amount with but little labour and expense.

It is in this vicinity that the celebrated submerged forests are found. "They consist of numerous dead trees stripped of their smaller branches, but still standing, and presenting every appearance of having grown there. As these trees could never have grown under water, their present position has given rise to much speculation."

One hundred and sixty miles from the mouth of the river are its wonderful cascades; fierce and whirling rapids where the river falls 40 feet, causing the water for five miles to be a seething whirlpool. The Columbia is 1300 miles long and second only in size to the Mississippi; opposite the Dalles it is about a quarter of a mile wide, is sluggish in its course, and has a depth of 80 feet. Steamers ply up and down between the rapids, and the portages are made by railroad. Sixteen miles from the Dalles, the Deschutes empties into the Columbia.

Oregon has an area of about 95,000 square miles, and although the temperature varies, owing to its mountains and valleys, yet on the whole the climate is good, being mild and not subject to any very extreme changes. Its resources, both vegetable and mineral, are great. Apples,

pears, plums, cherries, quinces, &c., are grown in the west of the Cascades in abundance, and some of these, especially the pears, attain enormous dimensions. Coal exists in beds of great thickness, thus affording the means of developing other essential industries. The gold finds are said already to yield a million and a half a year. The land in parts is admirably adapted for the cultivation of wheat which is of good quality and unsurpassed for heaviness of grain. Again, sheep-farming is conducted on an extensive scale in this State, and the profits accruing from the sale of the wool are admitted to be large and very remunerative. In the Deschutes basin the land is very fertile, and the supply of water for irrigation abundant. During our stay, dew was deposited each morning, but soon disappeared with the rays of the rising sun. The approach of winter is gradual and its arrival is heralded by preliminary storms. East of the Cascade Mountains the rainfall is not great. High winds are of occasional occurrence, but their violence cannot be compared to those we experienced in New Mexico.

Game is very plentiful in Oregon. The grizzly, black, and brown bears, and the white-tailed deer roam the mountains, and are very numerous. I had several opportunities of trying the efficacy of the combined Express rifle and shot gun, which indeed has proved a most serviceable weapon, both as to accuracy and range of fire. On the plains, and even among the timber, there are large herds of antelope; in fact, this State is a sportsman's Eldorado both for large and small game.

The adventurous return journey of four of our party from the Columbia River through the John Day country, and across the Blue Mountains and Oregon Desert into California, together with an account of the Indian tribes met, must be reserved for a future occasion.

Pévtsof's Expedition in North-Western Mongolia.

By E. DELMAR MORGAN.

Our readers may perhaps remember that Mr. Ney Elias in his remarkable journey across North-Western Mongolia in 1872, was prevented, by the disturbed state of the country consequent on the Mohammedan rebellion, from deviating as he had intended to the left of his line of march and exploring the region to the south of Uliassutai, where ruins of historical interest, the discovery of which was partly the object of his journey, may possibly be situated. The region left unvisited has now been examined by Lieutenant-Colonel Pévtsof, of the Russian staff, who accompanied a large caravan of Bisk merchants last summer from Kobdo to Kuku-Khoto, or as the Chinese call it, Kwei-hwa-cheng. The route taken by this expedition presents some features of novelty, for

it lies to the south of Ney Elias' route and to the north of that taken by Sosnofsky in 1875, whilst it diverges from the tracks of Printz and Matusofsky, whose routes will be found summarised in the appendix to Mr. Ney Elias' report.* It therefore crosses some of the least-known districts of North-Western Mongolia, and throws a new light on the orography of that region, as we shall endeavour presently to show.

Colonel Pévtsóf, accompanied by two topographers, left Kobdo with the caravan on the 6th of September, 1878 (or 18th new style). He first took a S.S.E. direction to Lake Kara or Ike-Aral-nor ("great lake with islands"), as it is generally marked on our maps, and as we prefer calling it *pace* Mr. Ney Elias and the Russian geographers who say that "Kara" is more correct; for this word, meaning "black," is of such universal local application in Central Asia that the old names are to be preferred as more distinctive. Thus Lake Lob is a more suitable name than the local "Kara-Kurchin" or "black swamp," as Colonel Prejevalsky learned it was called, and in the same way we prefer Ike-Aral-nor to Lake Kara.

To return to Colonel Pévtsóf's caravan after this digression. After proceeding along an open valley forming part of the Southern Altai Range for 120 miles, and then across a sandy plain 60 miles in extent, a mighty chain of mountains called Madotu-ula, i. e. "wooded mountains," a branch of the Southern Altai, was reached. This is probably the high range spoken of by Mr. Ney Elias, visible some 50 or 60 miles to the south of his route, which he calls the "Sirke," wisely following d'Anville's Atlas, for the native names are most bewildering. Having crossed a chain (possibly Ney Elias' "Urch") the caravan again descended to an open valley, bounded on the south by the same Madotu-ula Range and on the north by outliers of the Kangai Range running in a south-easterly direction. This led to the banks of the Dsabhin or Jabkhan of Ney Elias, Chabkhan of Russian maps and Chagantokoi of the Mongols, a river which rises in the Kangai Mountains, and after a course of about 450 miles, at first in a S.S.W. direction and then west and north-west, enters Lake Ike-aral at its northern end. On the bank of this river near a Buddhist temple or lamasery the caravan camped on the 28th of September, and the following day resumed its march, at first along the river bank and then across the slopes of the Kangai, which are separated from the Southern Altai by an open valley in which are situated four very large lakes, whilst to the south rise two lofty peaks of the Southern Altai—the Ikhi-Bogdo and Tsastu-Bogdo—described by M. Potanin. For about 190 miles the caravan kept among the mountains, the elevation gradually becoming lower, and on the 23rd of October a wide expanse of hilly plain could be seen. This was the Gobi. For about 100 miles of their journey across this desert they were much inconvenienced by violent sand and snow storms, prevalent through-

* 'Journal R. G. S.,' vol. xliii. p. 140.

out November, and it was not until they had accomplished another 100 miles of this march that they began to fall in with low flat ridges of hills; these were the north-eastern spurs of the Southern Altai, the main range trending north-west by west to its final disappearance in the Galpin Gobi in 42° N. lat. and 107° 51' long. east of Greenwich. The mountainous region subsequently entered by the caravan is entirely distinct from the Southern Altai and is 200 miles in extent. One hundred and seventy miles before reaching the town of Kwei-hwa-cheng the Gobi terminates, its breadth here being 350 miles. The last part of the route lies through a country thickly settled with Chinese. The lofty Ta-ching-sa or "great bright mountains" have to be crossed by a pass which Ney Elias estimated by barometrical measurement to be 5050 feet above sea-level. Hence the road descends to the plain on which is situated Kwei-hwa-cheng. This important trade centre was reached by the caravan on the 10th December, three months and four days after its departure from Kobdo.

In the absence of details it is impossible to do more than glance at the chief geographical results of Colonel Pévtsóf's journey as they are given in the Annual Report of the Russian Geographical Society. If these fall short of expectations and compare unfavourably with those obtained by Mr. Ney Elias it must be remembered that Colonel Pévtsóf laboured under the serious disadvantage of accompanying a large caravan; a mode of travel, which, though doubtless a security, greatly interferes with independent action, besides occasioning much loss of time. Mr. Ney Elias, whose party numbered only four, left Kwei-hwa-cheng on the 8th of September, and reached Kobdo on the 28th of November, occupying twelve days less time from point to point than Pévtsóf, though he stayed eight days at Uliassutai *en route*. From a geographical standpoint a complete survey of lakes Ike-aral and Turgén would have been most desirable, in order to set at rest some undecided points suggested by Mr. Ney Elias. But the sixteen astronomical positions fixed by Colonel Pévtsóf and his route-map will, of course, be welcome. The orography of this paper deserves especial attention, the term "Altai" being here applied to a great chain far to the south of the Siberian system—indeed, separated from it by the Gobi Desert—apparently and presumably, were not the contrary stated to be the case, a continuation of the In-shan Range extending in a north-westerly direction from the great northern bend of the Hwang-ho. As the subject is an interesting one, a brief *résumé* of earlier authorities on the great Altai system of Southern Siberia may not be out of place here.

When Carl Ritter wrote his famous work in 1832, the more southerly parts of the Altai were a *terra incognita*, regions where no learned traveller had set foot since the days of the Buddhist pilgrims, or the Byzantine envoy Zemarchus. The few who passed this way followed the caravan tracks, and made no attempts to scale the peaks and passes,

measure their height, and ascertain the structure of the range. As were the Swiss Alps long before an Alpine Society was founded, as many parts of the "frosty" Caucasus are to this day, so was the Altai Range to Western Europe down to the middle of last century. About that time, however, great efforts were made to dispel the obscurity in which the mountain ranges of Siberia were shrouded. The travels and literary labours of Gmelin, Pallas, Ledebour, Falk, Bunge and others, undertaken under the auspices of the Imperial Russian Academy of Sciences, were admirable contributions towards a knowledge of the subject, and the travels and works of Alexander von Humboldt, Adolf Erman, Timkofsky, Schmidt, Abel Rémusat, and the "ingenious" Klaproth, threw further light upon it. The term "Altai" was not in early use among the Russians. In the *Atlas Russicus* published in 1745 it is not even mentioned, and only appears in more recent works as applied to the marginal range of the high plateau of Inner Asia. Of its antiquity, however, proofs are not wanting. Marco Polo twice mentions it in speaking of the burial-place of the Tartar khans, and the Byzantine records point to a much earlier origin of the word. "Altai" in Turkish, "Altyn" in Mongul, meaning "golden," and answering to the Chinese "Kin," whence "Kin-shan" or "In-shan," "golden mountains," in the middle ages did not merely refer to a mountain or range, but came to be an attribute of the Mongol khans, "Altyn-khans" as they were called after they had established their empire on the ruins of the Chinese dynasty of Kin. It was only in attempting to systematise their geographical expressions, and for the sake of convenience that the Chinese geographers came to group independent chains into one system, Kin-shan or Altai, just as the Russians did much later in the north. In dividing, however, their Northern Altai into "Great" and "Little," "High" and "Low," Russian geographers introduced great confusion; for these distinctions, as Humboldt showed, were both misleading and inaccurate. They have accordingly been abandoned, the term "Southern" being now used to distinguish that branch of the Russian Altai which extends in a south-easterly direction, from the sources of the Irtysh towards the Gobi. Of this chain, and its connection with the basins of lakes Ike-aral and Ubsa but little is known, M. Potanin, who has studied the orography of this part of Asia, and has passed several consecutive years in exploring these ranges, having been hitherto chiefly occupied with the Kangai mountain range lying to the north-east of the districts in question. Matnsufsky, Miroshnichenko, and other staff officers engaged in surveying the Russo-Chinese frontier, as altered by the treaty of Chuguchak in 1864, were in no sense geographers or naturalists, however excellent their work as boundary commissioners and topographers. Printz was commercial agent of the Russian Government, and his visits to Kobdo and Uliassutai were mainly concerned with questions of trade. Ney Elias, as we have stated, was prevented from

deviating to the south of his route. Sosnofsky's journey from Hankau was too hurried to admit of scientific inquiry on subjects of high geographical interest. Thus Colonel Pévtsof is the first to explore a new route, and much is to be expected from his observations, though his terminology is open to criticism.

[Impl. Russ. Geog. Soc. Report for 1878, Sresnefsky, 31 *seqq.* Journal R.G.S., xliii. 108-139. Ritter's *Erdkunde von Asien*. Russian ed., ii. 172-195; Semenov's *Annotations*, iv. 1-4, 350-361. Yule's *Marco Polo*, 2nd ed., i. 241, 242, 262.]

GEOGRAPHICAL NOTES.

The Dutch Arctic Expedition.—Captain De Bruyne, the Commander of the Dutch Arctic Expedition, has reported his proceedings in a letter dated off Hammerfest on the 18th of last September, and published in the 'Amsterdam Courant' of October 17. The cruise has been wonderfully successful on the whole, the *Willem Barents* having sighted Franz-Josef Land, being the first sailing vessel that ever reached that distant goal—the first vessel, indeed, of any kind that has seen it, and returned in safety. On July 13th the explorers sailed from Vardö, and during the rest of that month, and in August, they took many deep-sea soundings and serial temperatures, and obtained dredgings in the Barents Sea. On August 6th they arrived in the Matoshkin Shar, and passed through the straits, but found the Kara Sea blocked with ice. On the 18th they met the *Isbjörn*, with Sir Henry Gore Booth and Captain Markham on board, and on the 20th the two little vessels sailed in company. Owing to gales of wind, and other circumstances, they did not meet again. The *Willem Barents* did not get beyond Cape Nassau, on the Novaya Zemlya coast, but on the 7th of September, with the wind from south-east, Captain De Bruyne was able to steer a northward course, unobstructed by ice, on the 54th meridian. At 6 p.m. on that day, the weather clearing up, high land was sighted, extending from N.E. $\frac{1}{2}$ E. to N.W. $\frac{1}{2}$ N. The high mountain, which was taken to be Mount Brunn, on MacClintock Island (a part of Franz-Josef Land), bore N.E. by N., and they were about four miles (Dutch?) from the shore, along which there was a broad belt of land ice. Later in the night the wind changed to N.N.E., and, shaping a course southwards, the *Willem Barents* made the best of her way to Hammerfest. A great number of scientific observations were taken during the cruise. A more complete account of the results of the exploring voyages of the *Willem Barents* and the *Isbjörn* will be given in a paper which Captain Markham is preparing for reading at an early meeting of the Society, on the Arctic campaign of 1879 in the Barents Sea.

The Indian Elephants presented by the King of the Belgians to the International African Expedition have arrived in good condition at Mpwapwa, and are now thought likely to answer well the purpose for

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which they were intended, viz. to be a substitute for porters on the long journeys in Central Africa, and thereby to facilitate African exploration. The idea is entertained of inducing Mr. Sanderson to come over from India with his staff of elephant-catchers for three years, for the purpose of capturing and training African elephants.

Professor Nordenskiöld, as we are informed by Mr. Oscar Dickson, is not expected to arrive in Europe before March.—We take this opportunity of recording the loss of the little vessel, the *Nordenskiöld*, which was sent by M. Sibiriakof to the aid of the Swedish Expedition, and commanded by Captain Sengstacke.* It was wrecked on its way from Yokohama to Behring Straits, in August, on the east coast of Yesso, near Nemoro Bay. In the interests of science this event is much to be regretted, as the *Nordenskiöld* was equipped for independent Arctic research, besides the relief of the Swedish Expedition.

Lake Kennedy.—The report of Captain G. E. Tyson upon the cruise of the *Florence*, edited by Captain Howgate, and referred to in "New Books," *infra* p. 743, contains some particulars with reference to this Arctic lake which, so far as they go (not being from the reporter's personal observation), may be worth extracting. The lake is placed on our charts at the west of Baffin Land, opposite the head of Cumberland Bay, in about 66° N. lat. and 73° W. long., just below the Arctic Circle. Captain Tyson states that Captain John Roach was the first white man, so far as he knows, who ever visited it. Captain Roach went there in April 1876, with two sleighs, manned by Eskimo, and was four days on the way to it from Kiekerton Island, going up a deep fjord a short distance from Kater-nuna. On arriving at the head of this fjord, he crossed a low, narrow neck of land, about 100 yards wide, and then entered on lake ice, travelling upon it for upwards of 15 miles, when he came to another lake, separated from the first by a similar narrow neck of land, about 200 yards broad. The second lake was followed for about 30 miles, when Kennedy Lake proper was reached, after crossing a third narrow neck of land. This lake was like the others ice-locked, and dotted with hundreds of small islands, many of exceedingly limited area: it apparently empties into Fox Channel or Dorchester Bay (still unexplored), as an Eskimo told Captain Tyson that in the summer of 1877 he was at its western extremity, and could still see nothing but water, on which he thought he saw a ship. After leaving the first lake, the mountains to the east were lost sight of, and no elevation was visible to the west, which was a vast snow-covered prairie, covered in summer with tall grass. The land was quite free from stones; the soil dark, abounding with fossils. The Eskimo carry their large, heavy boats to the large lake for the purpose of hunting and fishing, as reindeer, geese, ducks and other birds, and salmon, &c., are there found in great numbers.

* Vide *ante* pp. 3 (note), 208, 342.

Dr. Mullens' Expedition.—After the death of their leader, Dr. Mullens, in July last, his two companions, Messrs. Southon and Griffith, continued their march towards Ujiji, though without hopes of retrieving the loss which the geographical work of the Expedition has sustained by Dr. Mullens' death. The principal instruments lent by our Society, a theodolite and chronometer, were sent back to the coast, under the charge of Dr. Baxter, of the Church Missionary Society, Dr. Southon retaining the prismatic compass only. The party intend to take the route to Ujiji via the residence of King Mirambo.

River Rovuma, East Africa.—The attention of the Sultan of Zanzibar has been recently directed to the districts of the Upper Rovuma which form the extreme southern part of his dominions. Last year he sent a preliminary expedition by land to this region, which succeeded in settling disputes between the tribes on the Upper Rovuma, and in establishing a station on the river, where the Sultan's flag is now hoisted. In these operations the Zanzibar agents were assisted by the English missionaries settled at Msasi. The importance of this river is much enhanced by the coal-fields known to exist in its neighbourhood in the interior; but the commercial value of the mineral of course depends on the facilities for its transport to the coast. When Dr. Livingstone and Dr. Kirk explored the stream in 1861, and again in 1862, they were unable to pass the rapids which obstruct its navigation; and not much better success has rewarded a party sent by the Sultan this summer. Although it was found possible to pass the rapids in a native canoe as far as the Liende—a southern tributary on which the coal-beds are found—and to navigate this latter stream, where the coal was seen cropping-out on the rocky faces of the islands, the result of the examination was to prove that water-carriage to the Indian Ocean by the Rovuma was impossible. By land the coal-fields, the larger of which were not visited by the Sultan's expedition, are 150 miles distant from the coast.

Dr. Emil Holub.—In our last issue (p. 666) we promised to give in this number some particulars of Dr. Holub's career and work as a traveller. He has prepared a paper giving an account of his last and most important journey, which will be published after it has been read before the Society. A sketch of the traveller's history, intended as a preface to his narrative, was prepared by Colonel Yule, to whom Dr. Holub, on his arrival from Africa, had presented an introduction from Sir Bartle Frere. By an accident it was too late for our October number, and consequently, at the writer's request, was forwarded to the 'Athenæum,' in which it appeared (October 4th). The 'Times' also (October 8th) contained a notice of Dr. Holub's work. We may therefore now state the facts a little more briefly.

Dr. Holub is a native of Bohemia (of Czech nationality), and was born in 1847 at Holitz, not far from the memorable field of Sadova. The

son of a country surgeon, though from early years he took great delight in natural history and geography, his father's scanty means could aid him little, and even as a schoolboy he had, by teaching younger children, to wrest from fortune the means of procuring books. One of the first of these was Livingstone's earlier volume. Our own great traveller became the boy's hero and model, and the desire for African exploration, which the book kindled, never ceased to burn till it resulted in the journeys which have won him so much consideration and regard in the South African colonies, and in his native land, though his name is as yet but little familiar in England. In carrying out these journeys he did not forget the hero of his boyhood. Nor had the people on the Zambesi forgotten him! For when Holub sent a message to Sepopo, the great chief of the Barotse dominion, to pave the way for a visit, the chief's answer was, "Yes, if you come like *Monari* ('the Master'—Livingstone), not otherwise."

Soon after taking his degree of M.D., at Prague, he started for Africa (May 1872). So scantily was he provided with funds that, once fairly landed at Port Elizabeth, his pockets were absolutely bare. However, he managed to get to the Diamond Fields, which seem to form a "Happy Hunting-ground" for practitioners of medicine, and the seven years that have elapsed since then appear to have been pretty equally divided between periods devoted to the practice there which accumulated the funds for exploration, and periods of exploration in which the funds were expended.

The radius of his journeys on each successive occasion was extended. The earlier expeditions embraced the country of the Bechuana tribes, and a part of the Transvaal; his last, which was continued over twenty-one months, carried him to the dominion of Sepopo, already spoken of, on the Zambesi, a dominion of recent origin, reaching over wide tracts, and over a great variety of tribes. His medical skill aided him in acquiring the confidence of king and people, and favoured the acquisition of an intimate knowledge of the very various character and manners of the different races subject to Sepopo, of all of whom representatives were to be met with at his residence. Holub was, under these favourable circumstances, prosecuting his journey up the great river, a journey which he hoped to terminate at Loanda, when a succession of disasters culminated in a violent attack of jungle fever, which completely prostrated him, and put a stop to his wanderings for a time.

The object of Dr. Holub's explorations has not been (as it has been that of some other daring and valuable journeys) to drive a line through an unknown country, and to determine some one great geographical fact; it has been rather the thorough scientific conquest, so far as his means and capacity admitted, of the country traversed, and the collection of illustrations of knowledge of every kind. These collections are now all at Prague. They embrace besides some live animals, horns and

skins, vast numbers of insects, bird-skins, fishes, reptiles, nests and eggs, seeds, fruits, and herbaria, minerals, fossils, and a great variety of ethnographic objects, including a number of the famous Bushman "engravings on stones." The country traversed was regularly mapped by compass and pacing, and his surveys of the Zambesi, which he has plotted on a large scale, are of high interest; one part of them embracing a detailed map of the Victoria Fall, with the extraordinary zigzag chasm through which the water escapes after its descent. A great number of drawings of subjects of zoological, botanical, and ethnographical interest must not be omitted from the list. Dr. Holub's journeys have cost no man's life by violence, and heretofore they have cost no man's money except his own—laboriously earned, as has been said.

In the course of his repeated journeys he has acquired large experience of the character of the tribes, peaceful and warlike, between our colonies and the Zambesi and beyond it, and also has pondered much on Boers, Zulus, missionaries, and the policy of the Colonial Government, with the independence of one who is neither colonist, Englishman, nor Teuton; he has formed opinions of his own on a great many matters, and for some years past he has been in the habit of expressing them in his own somewhat peculiar English, in the South African newspapers. We shall be greatly disappointed if his book when it appears (may it find a worthy translator!) is not marked by a rich and rare variety of interest. That interest the *man* himself has excited in all who have had the pleasure of making his acquaintance.

A few days after his arrival in England, Holub had a heavy blow in the news of his father's death. The very excitement caused by the return of his son, by the compliments showered on the latter, and the news of the medal awarded him by the Geographical Society of Vienna, were too much for the old man; in earlier days he had often denied himself necessities that his son's studies might not be interrupted; he lived to know that his efforts had not been in vain, but that was all. The time, too, of Dr. Holub's arrival in England was unfavourable, when London and its societies were in the annual autumn torpor. Still he made some fast friends, and we trust soon to see him back among us.

The Native Territories of South Central Africa.* — The plateau region of the South African interior, peopled by independent native tribes, regarding which we expect soon to learn so much from the researches of Dr. Holub, has been for many years the field of labour to a resident explorer, Mr. Andrew A. Anderson. This gentleman commenced his explorations as far back as 1864, surveying the region north of the Orange River in Great Namaqua-land and the northern portion of the Kalahari Desert up to 16° S. lat., and inquiring into its geology, botany, and ethnology. The chief results of his investigations have

* Abridged from a Report (dated Pretoria, Sept. 17, 1878), addressed by Mr. Andrew A. Anderson to Sir Theophilus Shepstone, and communicated by the Colonial Office.

been embodied in a report he has recently addressed to Sir T. Shepstone. We extract from this the following facts:—The Matabeli country,* including the Mashona and Makalaka regions, of which Lobengule is king, is stated not to exceed 100,000 square miles in extent, but there are no means of estimating the population, though portions of Matabeli-land and the Mashona region are known to be thickly populated by the Zulu, Mashona, Makalaka, Bushmen,† and other tribes. The Makombe and other chiefs, to the east of the Mashona region, occupy a tract of country about 40,000 square miles in extent, bounded on the north by the River Zambesi and on the east by the Portuguese settlements, and have under their rule a large and industrious population. Umzila, an important chief, with others of less note, rules a region estimated at 70,000 square miles, and stretching from the Makombe country on the north to the River Limpopo on the south, and from Lobengule's territory on the west to that of the Portuguese on the east. Portions of this country are thickly populated, and the people are reported to be industrious. They, as well as their neighbours on the north, are engaged in the production and manufacture of cotton. The country about Lake Ngami is now ruled over by the son of Lechuatabele, the late chief, whose kraal, Mr. Anderson says, is on the east side of the lake and the River Zouga. His country is estimated at about 40,000 square miles, with a population not exceeding 20,000. Ovampo-land, on the west side of the Kalahari Desert, is well situated and highly favourable to cattle and sheep, having splendid grazing veldt, with plenty of water. The mountains are stated to be rich in minerals. The population is believed not to exceed 30,000, spread over 60,000 square miles of country; the people are industrious, and grow excellent corn, vegetables, &c. Damara-land, which lies to the west and south of the above, appears to be of somewhat uncertain extent as regards its northern boundary, the people claiming up to 17° S. lat.—a claim which is disputed by the Portuguese. The Damara country is bounded on the south by Great Namaqua-land, and with the exception noted before, extends from the sea to the Kalahari Desert on the east. It has recently been annexed by the Cape Government. The coast-line is a sandy waste, but the eastern portion is mountainous and rich in minerals. Great Namaqua-land, which is about 70,000 square miles in extent, is bounded by Damara-land on the north and the Orange River on the south, and extends from the sea to the Kalahari Desert on the east. The coast-line is a sandy waste, but on the eastern border, near the Great Fish River, there are good grazing-grounds and mountains rich in minerals. The population appears to be of a remarkably mixed

* Cf. also Notes on Matabeli-land, by the late Captain R. R. Patterson, *ante* p. 509.

† We are informed by Dr. Holub that these are not Bushmen. They have been called so by the Boers, owing to their language having a click in it; but they are an entirely different race from the Bushmen of the Cape Colony.

nature, consisting of Namaquas, Hottentots, Bushmen, Griquas and Damaras, with classes of half-castes, "Kurumas," "Veldtskoon drawers," "Bundle Swaarts," "Africanders," besides many runaway Kafirs from Cape Colony. They live under petty captains in small locations, and do not exceed 20,000 in number; they are lawless and dangerous, and many traders have been plundered by them. On the eastern side of the Kalahari Desert, and to the south of the Matabeli, extending down to the British colonies, are several tribes occupying a considerable portion of South Central Africa. First comes the Bamangwato country,* which on the north extends to the Zambesi west of the Victoria Falls, from this point marching with Lobengule's territory to the Limpopo, which on the east separates it from the Transvaal; on the south it is bounded by Secheli's territory, and on the west by the Kalahari Desert and the Lake Ngani district. The Bamangwato country contains 70,000 square miles, with a population of 45,000. The country of Secheli, the chief town of which is Molopolole, extends to the Limpopo on the east, the Kalahari Desert on the west, and on the south to the region occupied by the chiefs Macasi and Gasietsise. The population, exclusive of Bushmen, does not exceed 45,000.† in a region estimated to contain about 30,000 square miles. There are also two chiefs in Secheli's country, with an independent following of about 30,000. On the south of Secheli's country is that of Gasietsise, some 60,000 square miles in extent, the chief town of which is Kanya. This chief's territory is bounded by Macasi's on the east, by the Transvaal and Monsiwe's land on the south, and the Kalahari Desert on the west. The population, exclusive of Bushmen, but including the followers of Manupi and Pelau, who are living in Gasietsise's territory by sufferance, is put down at 35,000. Monsiwe, a chief on the south of Gasietsise, holds about 20,000 square miles of country between the Transvaal and the Desert. The population is uncertain, but including tribes living on his land by sufferance, cannot exceed 15,000.‡ To the north of Griqua-land West are several petty tribes, numbering about 20,000, occupying a region some 30,000 square miles in extent. The Kalahari Desert is 900 miles in length, and in some places 500 miles in breadth, and contains upwards of 260,000 square miles, exclusive of some 20,000 square miles on the Orange River. From the British Colonies on the south up to 16° S. lat., Mr. Anderson estimates that there are 950,000 square miles of country south of the Zambesi, and 50,000 square miles on the north of the river, exclusive of the Portuguese possessions on the east and west coasts. From 1869 to 1872, Mr. Anderson was engaged in completing his survey, begun in 1864, of the Kalahari Desert, which had previously never been

* Cf. also the late Captain R. R. Patterson's paper on the Bamangwato country, *ante* p. 240.

† Dr. Holub states it to be 30,000 only.

‡ More than 30,000, as we are informed by Dr. Holub.

explored, and in his travels was always accompanied by a large number of Bushmen, who, he states, are the best behaved of all the black races he has met with in Africa, quiet and inoffensive, but at the same time the most ill-treated. The Desert is rich in minerals, coal, being plentiful in many districts, and copper abundant on the west side. Mr. Anderson also discovered gold in two mountain ranges. The country, he says, is well adapted for farming in parts where water can always be obtained; there are beautiful grass plains abounding with game, and large forests of bush and timber. There are certain parts where water is not to be got in the dry season, but in the large sand rivers which cross the Desert in all directions, it can be found, and in the rainy season, from January to May, any portion of the Desert can be explored. Sheep, bucks, and cattle soon get fat on the herbage, and if proper means were adopted to obtain water, Mr. Anderson expresses the opinion that the Kalahari could be made one of the finest countries in South Africa, and a splendid field for emigrants. The greatest opening for enterprise, however, is in the cotton-growing district of the Mashona country, now closed to Europeans by Lobengule. The extent of the cotton-growing region exceeds 25,000 square miles, and water-carriage to the east coast can to a great extent be made available at little expense. Rice is also extensively cultivated in the same locality, and gold is found in the country, as well as silver and other minerals. Spices of all kinds flourish there, while oranges, lemons, citrons, and vegetables arrive at great perfection. With the exception of the Portuguese settlements on the east coast, the fever districts are confined more particularly to the valley of the Zambesi and the tract of country on the east of Lake Ngami; they also extend from the Lake to the River Chobe [the Cuando of Major Serpa Pinto], and along all the low country towards the great salt-pan, called Makarikari, up to the Victoria Falls, including the Zouga and Mababe rivers. The sickly season begins when the mapane trees, which grow to a great size, and resemble the orange in leaf and flower, throw out fresh shoots, but the country is free from fever from the beginning of May to October. Large portions of Matabeli-land, the Mashona district, and the country to the east are free from fever, but there are portions which are very unhealthy, and it is only safe to venture there between the end of May and November. On all the uplands and mountain ranges, however, fever is unknown. On the west of Lake Ngami, in the Kalahari, Ovampo, Damara, and Namaqua lands, the climate is exceedingly healthy. In the other regions it is similar to that of Griqualand West and the Transvaal, which are considered to be very healthy throughout the year.

Rectification of the Map of Afghanistan.—Lieut. R. C. Temple, of the Thal-Chotiali field-force in the recent campaign, thus sums up, in a paper which will shortly be published in our 'Journal,' the changes in our ideas respecting the geography of the south-eastern part of Afghanistan

resulting from the survey of the party to which he belonged :—Firstly, the long range of mountains to the north of Quetta, the Bolan and the Mari hills, supposed to run east and west from the Sulimani Range, does not exist. The direction of the mountains is generally north and south, in lines more or less parallel to the Sulimani Range. Secondly, the Toba, Joba, or Yoba Peak, to be found on so many maps, at the head of the Zhob Valley, is most likely a myth or misnomer. Nothing approaching to such a name could be ascertained locally. Thirdly, Mount Kand is not nearly so far north as previously placed; while there are some doubts as to the existence of Mount Chapar, at any rate, it is not a prominent mountain, as before supposed. A round-headed, snow-capped mountain was repeatedly pointed out from the Pishin as Mount Chapar; when, however, it came to be identified from a hill above Isaf Kaeh, which should have been in its neighbourhood, an apparently low hill in the right position was by some of the guides pointed out as Mount Chapar, while others seemed doubtful of its existence. Lastly, several prominent peaks have been for the first time named and placed. As regards nomenclature, the name Khojah Amran *Range* is a misnomer. Ranges or lines of hills, as a rule, have no generic name in Afghanistan, the Afghan system of nomenclature not having yet reached that stage. But nearly every prominent or remarkable peak has a name of its own. In this case, Khojah Amran is really the name of a point above the Gwaja Pass, and not that of the whole range. If any name belongs to the entire line of mountains, it is Raghani. However, as the name Khojah Amran has become popularised in geography, it would be a pity, perhaps, as well as almost useless, to try and alter it. The town, Pishin, also, mentioned by so many travellers, does not exist. They probably meant by the term the cluster of Sayad and Tarin villages about Sayad-Paind and Alizai, in the Pishin Valley.

Kafiristan and the Kafir Language.—Previous to undertaking the dangerous expedition into Kafiristan, of which we gave a short account *ante* p. 514, Major Tanner gleaned from native informants some very interesting information regarding the Kafirs and their language, which he communicated in a letter to General Walker, Surveyor-General of India. We regret to learn that Major Tanner has been obliged, through ill-health, to abandon his expedition. The letter just referred to runs as follows :—

“ I told you in a former letter that I had found a new language. I am steadily going on with it, for it is closely allied with the language of the Kafirs. My interpreter, Hassain Khan, a resident of Kunar, teaches me; it is his mother-tongue, and he has brought to my aid one of the Sirdars of Kunar, Mir Ahmed Khan, of Shewa (or Kél, as the Kunar people call it). The Mir is very intelligent, and has influence among all the tribes to his north, and I am quite confident that I require only his help to get me a footing in Kafiristan. . . . Shewa is

at the mouth of the Dara Núr (Valley of Light?), which runs into the Kund Mountain. The villages up the valley are inhabited by Dehgans, who are not Pathans, but descendants of the original people of this country (probably), and Mir Ahmed Khan has great influence among them. Beyond Dara Núr, there comes Mázár Dara, which rises also in Kund, and flows south-east, falling into the Kunar River at Nurgal, and it is the inhabitants of this valley who are my stumbling-block. . . . Beyond Mázár Dara, there flows Chauki Dara, also rising in Kund, but having a course almost easterly (as I take it); the inhabitants are Safis and Momands. . . . Now, beyond Chauki is Pech, a valley (or *dara*), also rising in Kund, but flowing north-east into the Kunar River. Of Pech I know little or nothing; but it is beyond Pech that the interesting and unknown tract of Kafiristan commences, and it is to introduce to you two of the inhabitants of the valley north-west of Pech, that I have entered into this long and tedious preface. I had long heard of a tribe called Chúguni, and I, therefore, sent the Subadar (Hassain Khan, my interpreter) to bring some of them in to me. These Chúgunis are the next-door neighbours of the Kafirs, and live in a valley, which, as far as I can understand, flows from Kund northwards, and turning east empties itself into the Kunar near Chágár Sarai. They are a powerful elan, but are true wild men of the hills, and seldom come as far as Jalalabad; and like all true and wild mountaineers, dislike exposing themselves to the unknown perils which may be experienced in travelling in an open plain. To sell their *ghi*, cheese and wood, the Chúgunis cross the head-waters of the valleys I have named, and come down into the Dara Núr at *Amla* (Indian name); and it was at that place that the Subadar found the two specimens which he brought to me. He had to give his nephew as a hostage and make many protestations of friendship before they would consent to come. Wild ragged fellows they were, of pale complexion and thin features; their legs were clothed with coarse goat's-hair socks, then an outer covering of goat's hair, and remarkably curious untanned shoes tied on in a cunning fashion. One of them spoke nothing but his own language, but the other, who was described to me as being a great warrior, spoke Pushtu; so, with the Subadar as an interpreter, we got on very well together. I kept the men four days, and during that time, when I had leisure, managed to elicit a good deal of information about them and their valleys. The 'warrior' informed me that he had been brought up amongst the Kafirs, and, indeed, I found that his own language differed but little from that of the Kafirs, which he appeared to know thoroughly. I learned—I cannot say with any amount of pleasure—that there are nearly as many languages in Kafiristan as there are tribes, but of this I am pretty well sure, that the one which I have been learning from the Subadar, may be taken as typical of the whole. I asked the Chúguni the numbers in the Kafir tongue, and they almost exactly correspond with those given by Burns, but the dialogue given by him differs as much from the Kafir language of my

Chúguni, as the latter does from the Kunar language, which may be broadly called the Kunar dialect of the Kochis. My two wild men soon tired of this place and its novel and strange sights, and went away assuring me that my life would be protected by them in their own valley, as they would protect their own heads. They have gone under a promise to bring two Lál Kafirs, and it is with the Chúgunis that I must enter Kafiristan, if I do it at all." In this connection it may be mentioned that the late Mr. W. Jenkyns, Sir P. L. Cavagnari's assistant at Kabul, was at the time of his death engaged in working up an account of the language of Kafiristan.

Colonel Prejevalsky's Expedition.—The last news received of Colonel Prejevalsky's progress is that he had arrived at Sha-chan on the 20th of June, after crossing the Gobi Desert by some route leading apparently direct from Hami to Sha-chau. He states that the desert attains at one point an elevation of 5000 feet, but that the Sha-chau oasis, which he describes as very fertile, is only 3500 feet high. Southwards there runs a range covered with perpetual snow, and evidently to be identified with the Altyn-tagh of his former journey to Lob-Nor. The Expedition proposed to rest at Sha-chau till the end of July, and then to set out for Lhassa, the capital of Tibet, by way of Tsaidam. This intelligence has come by way of Troitskosavsk and Peking—a most roundabout way—but nevertheless it contains a record of the Colonel's journey up to a much later date than the news recently announced to the Imperial Russian Geographical Society, which traced his progress only as far as Hami.—The statement that scientific observations had been successfully taken, leads us to expect a very important enlargement of our knowledge of Mongolia, which is almost unexplored in this direction.

Projected Connection of the Caspian and Black Seas.—The old idea of connecting the Caspian Sea and the Sea of Azof has been revived, this time by a M. Danilof, who proposes to effect it by a scheme quite different from all previous ones. In constructing the railway from Rostof to Vladikafkaz he was struck with the volume of water in the Terek and Malka rivers, and thence conceived the idea of turning the former stream, by means of a canal 320 versts long, into the Manytch River, and so increase the bulk of the latter, while a second canal, 350 versts long, would run to Astrakhan and complete the chain of communication. From a commercial point of view the project, if successful, would be very important, as the coal of the Don Valley could be freely exchanged for the wheat, timber, salt, and iron of the basin of the Volga, and naphtha, kerosine, and cotton from the Caspian. The network of canals would be further completed by communication with the Kuban River, which also discharges itself into the Sea of Azof. The cost of the undertaking is estimated at forty millions of roubles, and M. Danilof has been commissioned by the Russian Government to execute a survey of the country in question.

The Effects of the Great Snowfall in Kashmir.—Mr. R. Lydekker has contributed to the concluding part of the last 'Journal' of the Asiatic Society of Bengal some brief notes on the enormous quantities of snow which fell on the mountains and valleys of the Kashmir Himalaya in the winter and spring of 1877-8. Between October 1877 and May 1878, there seems to have been an almost incessant fall of snow on the higher mountains and valleys, and though it was, of course, difficult to form a correct estimate from native reports, he thinks that at Dras (alt. 10,000 feet) the snow was from 30 to 40 feet thick on the level. The effects of this abnormal snowfall were to be seen throughout the country, and it would ever be remembered by the terrible famine which ensued. At Dras the strong travellers' bungalow was entirely crushed down by the weight of the snow which fell on it; and in the neighbouring mountains most of the log-houses and huts also fell. In the higher mountains whole hill-sides were denuded of vegetation and soil by the enormous avalanches which swept down them, leaving vast gaps in the primæval forests, and choking the valleys below with the débris of rocks and trees. Mr. Lydekker furnishes some interesting notes on the amount of the snowfall in the Zogi Pass, leading from Kashmir to Dras, which is situated at an elevation of 11,300 feet above the sea-level. From these we learn that as late as August 1878 the ravine leading up to the pass from the Kashmir side was still filled with snow to a probable depth of at least 150 feet, and it was only in September that the true road, which runs along one bank of the ravine, was beginning to get clear, though the snow here generally breaks up early in June. It is almost unnecessary to point out that if a snowfall like this were to be of constant occurrence in the Himalaya, the permanent snow-line would lie at a much lower level than now, and that the glaciers would greatly increase in size and descend much lower into the valleys. In conclusion, Mr. Lydekker adds some remarks on the destruction of animal life caused by this great snowfall. In the upper Wardwan and Tilail valleys, large numbers of ibex were seen imbedded in the snow in different parts; while near the saline springs in the Tilail Valley, where ibex are always to be found towards the end of summer, only one solitary buck was seen in 1878. Even the red bears (*Ursus isabellinus*) were far less numerous than usual, owing to their winter quarters having been snowed up so long that the occupants perished from hunger. The same explanation will, doubtless, account for the fact that in the higher regions many of the marmot burrows were deserted.

Exploration of the Swat River.—The native explorer named the "Mullah," known for his surveys of the Indus and Kunar rivers, has recently achieved another excellent piece of exploring work on the north-western confines of British India. He has traced the Swat River up to its source, and then, crossing the main water-parting between the Swat and the Indus, journeyed down the Karang Valley, which is now

accurately defined for the first time. The results will be found embodied in General Walker's map of Turkistan.

Exploration in Perak.—At the end of the summer of last year the officer in charge of Kinta district, accompanied by two Europeans and twenty-one Malays, undertook a journey of exploration to the source of the Kinta River and the high land in Eastern Perak, a region never before visited by Europeans, and almost equally unknown to the Malays. After the party reached the point, where the track marked in Mr. Daly's map branches off to Kwala Kangsa, a rough survey of their route was made by noting bearings and time. On the second day the party camped at Kwala Smut, where the river is very picturesque, breaking over rocks, and quite impassable for boats. The next day, having received an accession of four Sakis, they made a start, and began to experience the difficulties of travelling in the Saki country, as they had to march for two hours in the bed of the stream up to their waists in the water, which was rushing over the slippery granite rocks. After leaving the Kinta, they ascended Gunong Lentore, from which they followed another ridge, bearing almost north, to near the top of Gunong Monie; but as there was no water there, they had to descend to the north-east until they met the Sungei Penglow, and then crossed a small ridge to the Sungei Liong, which is a considerable stream. They followed its course to the foot of Gunong Riam, the ascent of which they found difficult. Passing through dense forest, they reached the zone of mosses and rhododendrons, and here they came on a comparatively level spot of the ridge, which was about 15 to 20 feet wide, with almost perpendicular precipices on either side. For a few minutes after reaching this place, they had a magnificent view, the Larut and Kwala Kangsa hills standing prominently out, and Telok Serrai being well defined. The vegetation at this elevation was very stunted, and there was nothing to make a shelter with. On ascending to the summit (where the barometer showed 25·45 inches, and the thermometer stood at 59° F.), they had a much more extensive view than before. The whole of Perak lay at their feet, and they could see the hills of Province Wellesley to the north, the sea being visible to the south of Panchore as well as at several intervening places along the coast. To the south-east a high hill sloped gradually up from the west, which the Sakis called Gunong Challie, and along its southern base flowed the Sungei Kinta. Over some high ground again they saw the basin of the Sungei Punou, which appeared to flow in a north-westerly direction, and on the southern side of it was Gunong Rampip, rising to a considerable elevation. As far as they could ascertain, they were not only the first Europeans to visit Gunong Riam, but actually the first men to stand on the top of the peak, for neither Malays nor Sakis go near it. Descending along the ridge from Gunong Riam to the east, on their way to a hill to the east, the party noticed a curious feature, which is also to be found on Gunong

Babo—a ditch from four to 12 feet deep runs along the centre of the ridge, beyond the banks of which the hill descends almost vertically on either side, and it is evidently caused by water, for where the ridge becomes level, it ceases. At length the top of the peak, which had been seen from Gunong Riam, was reached, and it appeared to be higher than any of those in the neighbourhood. As none of the Sakis could give a name for it, it was called Gunong Robinson, after the governor of the Straits Settlements. The barometer at 3 p.m. indicated 23·98 inches, with the thermometer at 67° Fahrenheit. From this point the party obtained the bearings and names of some of the surrounding peaks, and among others one remarkable sugar-loaf hill, which the Sakis called Gunong Yong Yup, and which they said was where the Sungei Plush took its rise. There was also another remarkable peak, with two pillar-like rocks on its summit. To the north and east of these there appeared to be a long stretch of lower hills, on which the Sakis say there is a track across the peninsula. In the ascent of Gunong Robinson, it may be mentioned, several plants of wild cinnamon were met with, as well as a plant which was believed to be the tea shrub. Travelling afterwards in a southerly direction, the party reached the watershed of the Sungei Pimon and the Sungei Ryah, where the barometer marked 27·73 inches, with the thermometer at 75° F. Failing to get guides at a Saki settlement to take them to Gopeng or Kampar, they continued their course to the Sungei Ryah, and eventually, owing to heavy rains and other causes, they were obliged to follow it down to the low country, giving up for the time the remaining portion of their projected journey.

Conservation of Waterways in China.—Though the Chinese in many parts of the empire are almost entirely dependent for means of internal communication on their natural and artificial waterways, their officials have not, as a rule, been credited with much foresight or practical intelligence in the conservation of these important national highways. Considerable interest, therefore, attaches to a memorial* recently addressed to the Emperor by an officer, named Hsi Jung, embodying a series of proposals for the conservation and improvement of the waterways of Kiang-su and Ngan-hwui. The first part of the memorial deals with the water-system fed by and draining into the Tai Hu, but the more important part treats of the region lying between the Yang-tsze Kiang and the Yellow River. Speaking generally, Hsi Jung says, the Hung-tsé Lake forms the upper reservoir for feeding and drainage of this system; the five *tang*, or dykes, control its central portion, and the Mang-tao and Grand Canal form the connecting channels with the Yang-tsze, while the Miao-wan and Wan-ti-kwan rivers connect the system with the sea. The method in which this system should be

* A translation of this long memorial from the 'Peking Gazette' was published in the 'North China Herald' of June 3, 1879.

preserved, he conceives, lies in the deepening of the Hung-tsé Lake in such manner as will render it capable of holding the water drained into it, maintaining the five dykes in such order that they may be available for purposes of irrigation, and keeping free communication along the four rivers mentioned above. The ancient dykes, or embankments, do not now appear to be of much use, a fact which is attributed to the rivers having changed their course. Not only is the river, or rather canal, at Hwai-ngan and Yang-chow different from what it was in ancient times, but it has undergone a marked change during the past twenty years. Before that time, Hsi Jung says, the waters of the Hung-tsé Lake were agitated by high winds into great waves all through the year, but now in dry seasons it is possible to walk across it. There used to be a brick-faced dyke at Kao-chia-yen, but the bricks were used to build a wall round Chingchiang-pu on the old course of the Yellow River, which, if its waters should chance to return, would consequently cause incalculable damage. It is, therefore, suggested by the memorialist that high responsible officials should be sent to the spot to seek reliable information, with a view to determining what permanent provision can be made against the silting up of the present channel and consequent flooding of the country. The sluices in the various tidal streams should also be put in order, with a view to preventing the entry of mud, &c., and the inner waters thus secured from obstruction caused by deposits. The memorial concludes by recommending the construction of a sluice at the Chinkiang mouth of the Grand Canal, and a considerable amount of dredging, on which latter point Hsi Jung remarks:—In former days dredging was expensive work, but now that machines can be employed, these might be constructed at one of the arsenals, or foreign dredgers might be hired, which would do the work both more rapidly and economically, and show immediate results.—The officer in question would appear to have been employed at Peking, and he, no doubt, derives some of his ideas from the results which he has seen produced by the steam dredging-machine employed under Li Hungchang's orders in clearing out the creeks near Tientsin.

Mr. E. Colborne Baber's Journey to Ta-chien-lu.—Mr. Baber, who is stationed at Chung-king in the Chinese province of Sze-chuen on special service, started early last year with the intention of making a rough survey of the River Min between Kia-ting and Sui-fu (Blakiston's Sü-chow), and of crossing the mountains from the former city to Fu-liu in longitude 103°. On reaching Fu-liu, however, the country further west held out so many attractions that he was induced to travel on to Tsz-eta-ti, the head-quarters of a Si-fan chief, styled Wang Chienlui. There he heard of the existence of a mountain track to Ta-chien-lu, but he thought it best to abandon the project he had formed of visiting that famous border town, on learning from the chief that he could not guarantee his safety in so wild a region. Thereupon he turned back,

but at the village of Na-ur-pa, the first stage, he was robbed during the night of all his money, and other property. Failing to obtain redress on the spot, he applied to the higher provincial authorities, and in the end the local official was ordered to capture the burglars, and make good Mr. Baber's loss. As he was not able to find the money at once, Mr. Baber, after some negotiation, offered to travel on to Ta-chien-lu, and to receive payment on his return. Accordingly he again turned north-west, and he remarks that he met with no worse impediments during his journey than natural difficulties, such as fevers and the extreme ruggedness of the mountain ranges. He quitted cultivated country at the foot of a pine forest, through which he travelled for three days, ascending continually till he came to a snowy pass, the only one in the country which, as the natives say, *hang jén*, i. e. stops people's breathing. Descending its northern slope, he soon found that he had left China behind. The valley was nearly all pasture-land, in which were grazing herds of yaks. On entering a hut, he found it impossible to communicate with the family, even a Si-fan, whom he had with him, being unintelligible to them. Further on he came to a great heap of slates inscribed with Sanscrit characters, from which he perceived that he was in Tibet; for, although Tibet proper is many hundred miles west of this point, yet tribes of Tibetan race and language extend right up to the banks of the Ta-tu River,—a fact which does not appear to have been recorded before. At the foot of the valley Mr. Baber struck the high road from Li-tang to Ta-chien-lu, arriving at the latter town on April 23rd. During a stay of three weeks there, he obtained much information regarding the condition of the numerous countries included in the general name of Tibet, about which and commercial products and distribution he states that he will have much to report that is interesting and, he thinks, useful. Mr. Baber returned to Fu-liu by the high-road, and after receiving compensation from the magistrate for his losses, proceeded on to Kia-ting by the by-road along which he had travelled before. At Kia-ting he took the opportunity afforded by the arrival of a Lolo chief, who called upon him, to make notes of the customs and language of his tribe. He had previously collected a sufficient vocabulary of the Si-fan dialects. From Kia-ting he dropped easily down the flooded river, and without encountering a single rapid, and having deep water all the way, in six days arrived at Chung-king on June 24th, after an absence of nearly five months.—In concluding the report of this journey, Mr. Baber states that the information collected during his various journeys enables him to report, with some confidence, on the trade and production of Western Sze-chuen, and their bearing on the commercial capabilities of Chung-king. He is preparing a report on this subject, which he proposes to supplement with a full account of his explorations.

Projected Lengthening of the Gulf of California.—The possibility of

filling up the remarkable depressions in the surface of the inland country at the northern extremity of the Gulf of California, has been long ago entertained in America. Some notes on this subject will be found in the introductory chapter to Dr. W. Bell's 'New Tracks in North America' (Chapman and Hall, 1869). The matter, however, does not appear to have taken definite shape until quite recently, General Fremont having taken it up, with the intention of benefiting the State of Arizona, of which he is governor. His plan is to bring the waters of the Gulf into what some suppose to be their old basin in Southern California. This depressed area, now a dry and sandy desert, is 200 miles in length, and 50 miles in width; its central part being stated as 350 feet below the level of the sea, though Dr. Bell does not mention so deep a depression as this. This tract of country lies on the western border of Arizona, and in its present condition is quite useless. Between the head of the Gulf of California and the basin or valley in question a ridge of land about 10 miles broad interposes, separating the waters of the Gulf from the first depression, i. e. the Soda Lake, about 70 feet below tide-water, and 20 miles long. Through this ridge General Fremont proposes to cut a canal, and at the other end of the lake to continue the canal for a further distance of about 15 miles. It is estimated that the work would cost 200,000*l.*, and might be completed in six months. If this project be carried out, it will, no doubt, prove to be a very great benefit to both California and Arizona. The great wants of the latter State are water and moisture; and the eastern slope of the low range of mountains which separates the basin in question from Arizona is as arid and devoid of vegetation as the basin itself. The introduction of so large a body of water would, in short, change the whole character of the region, from a barren waste to an agricultural country like that of the Mormons in Utah.

The so-called Two-Ocean Pass in Wyoming.—In the centre of the North American continent there is a source from which water flows both to the Pacific and to the Atlantic oceans—to the Pacific by the Columbia River, and to the Atlantic by the Missouri. This geographical peculiarity has not hitherto been clearly explained, though it is noted on some maps dating as far back as 1851, and was mentioned by Captains W. F. Reynolds and Jones in their respective reports on the exploration of the Yellowstone and of North-Western Wyoming. On his return last season from the Yellowstone Park, Dr. F. V. Hayden passed over this divide, and made a careful study of it. From his report, with a copy of which he has just favoured us, we abridge the following notes on the subject:—The pass is in about 110° W. long., 44° 5' N. lat. Dr. Hayden's party passed up the east side of the Yellowstone Lake to the mouth of the Upper Yellowstone River, and thence up the valley of that stream to what may be called the Three Forks, near Bridger's Lake, the eastern one of which is named Atlantic Creek. From the Three Forks the party

traversed the valley of this creek to the south-west, and, so far as could be seen from the summit of the mountains on either side, no divide could be observed. At the summit, not over ten miles from the junction of the Atlantic Creek with the Upper Yellowstone, the elevation, 8081 feet, is not more than 150 feet above the valley of the main stream. The valley is at first quite narrow, but it gradually expands into an open grassy meadow, which near the pass becomes one-third of a mile in width, and gradually closes up again into a cañon on the Pacific slope. So obscure is the drainage, Dr. Hayden says, that although the party camped at night within a quarter of a mile of the water-divide, they did not perceive it till the next day. The conditions, as described by Dr. Hayden, are briefly as follows:—The summit of the pass for about half a mile is so nearly level that a marsh is formed, which at times becomes a small lake. A portion of the waters from the surrounding mountains accumulates in the marshy meadows, and gradually gravitates from either side into two small streams, one of which flows to the north-east, and the other towards the south-west. On the east side of the divide there is a depression or gorge in the mountains, occupied by a small stream, which at the time of Dr. Hayden's visit flowed in a well-marked channel towards the north-east into Atlantic Creek. This is the well-known Two-Ocean Creek. At the base of the mountain-side a small stream rises from a spring, which at the time of the visit was nearly dry, and but little water was running in Two-Ocean Creek. This spring-hole was not more than six feet from the latter creek, and a small dry channel connecting the two showed that in times of high water a portion of the water flowing down the mountain-channel broke over the side into the spring-hole, and flowed thence to the Pacific Creek. Besides this, there are, lower down, two places where old channels, connecting in time of high water with the above-mentioned affluent of the Pacific Creek, show that a portion of the waters that started down the mountain-side towards the Atlantic is diverted to the Pacific side. Dr. Hayden thinks that the waters of the grassy meadows at the top of the pass probably separate, a part taking one direction and a part the other, while the little lake or marsh in the centre furnishes a supply or reservoir for both.

West Indies: Exploration of the Lesser Antilles.—Mr. Frederick Ober, a naturalist in the employ of the Smithsonian Institution of Washington, has been recently engaged in exploring the islands of the Lesser Antilles, and has made some interesting discoveries. He commenced his researches in Martinique towards the end of 1876, and devoted the two following years to the thorough examination of that and the other islands of both the Windward and the Leeward groups. In the larger and more mountainous islands he remarked three zones of vegetation in ascending the volcanic peaks, each zone characterised by different species of birds. The first, or littoral, zone has but a poor

fauna, on account of the original arboreal vegetation having been cleared for sugar-cane plantations. The second, or middle, zone, from 1500 to 2500 feet, is richest in its variety of forms both animal and vegetable, the trees growing to a great height and harbouring a vast variety of ferns and tropical epiphytes. The third zone commences at 2500 feet, and is distinguished by the absence of lofty trees and a less numerous fauna. At Dominica Mr. Ober took up his residence in a mountain valley 1500 feet above the sea-level, and devoted himself for a long time to collecting and observing the products of the surrounding woods, discovering many new species, even of such a well-worked class as birds. In a retired part of the mountains he had opportunities of studying the aboriginal Carib race, a remnant of which is still extant in the island. He took numerous photographs of them, and noted down a vocabulary of their language, remarking a singular variation in the primitive language as spoken among the men. Here he secured specimens of the rare parrot *Chrysotis Augusta*. His visits to the Windward Islands, Antigua and Barbadoes were unproductive, these islands being flat and of coral formation. But at St. Vincent his ornithological booty was very large and scientifically valuable; seven species being considered new to science. In order to procure one rare species, named by Mr. Lawrence *Madestes sibilans*, the "hissing bird," Mr. Ober was obliged to camp for a whole week in a cavern. The few Caribs remaining in St. Vincent live in the northern part of the island, quite isolated from the white population. Mr. Ober secured some of their ancient utensils, and made photographs of their rock drawings and inscriptions. In Grenada he found three new birds, and confirmed the inference drawn from the depth of soundings between the islands that the fauna of this island must be totally different from that of the not far distant Tobago and Trinidad.

Dr. Crevaux's Further Journeys in South America.—This enterprising traveller returned to France in September, having accomplished in a wonderfully short space of time the journey up the Amazons to the Andes of New Granada, which he was planning only in April last, as recorded in our August number. He ascended the main Amazons to the mouth of the Iça, and thence pursued his course up that little-known tributary to its head-waters, from which he crossed to the city of Pasto on the Andes; his return journey being by the River Japura to the main Amazons. The entire route amounts to about 4000 miles, nearly the half of which was along rivers inhabited only by Indians. We hope shortly to be able to give further details of this remarkable river voyage.

Mr. W. H. Tietkins' Journey in South Australia.—We learn from the Australian papers that our Associate Mr. Tietkins has started for the interior of South Australia from Fowler's Bay, near the head of the

Great Australian Bight (about E. long. $132^{\circ} 30'$, S. lat. 32°), with the view of exploring the country between the coast and the Musgrave Ranges at the north of South Australia proper. Mr. Tietkins proposes to establish a depôt at Youldah, and thence to proceed to Ouldabinna (E. long. $131^{\circ} 15' 4''$, S. lat. $29^{\circ} 7' 4''$), distant 92 miles in a north-westerly direction. In a letter which he wrote previous to his departure, Mr. Tietkins stated that he intended to put down a well for water at Ouldabinna, and, if successful in this, he considered that a safe road would then be opened to the Musgrave Ranges, about 200 miles distant, in proceeding to which he would cross his former route in 1875 in about 131° E. long., $26^{\circ} 30'$ S. lat. He has a very high opinion of the country between Ouldabinna and the Musgrave Ranges, and he believes that in a few years' time it will be occupied for sheep-farming purposes. As is usual in most cases of Australian exploration, the chief difficulty of this journey will be the want of water, hardly any, for instance, being procurable between Youldah and Ouldabinna. It was Mr. Tietkins' intention to take levels along his whole route, and to make a running survey of the country, but we believe that the limited means at his disposal will much restrict his operations in a scientific direction. Mr. Tietkins, in conjunction with Mr. Jess Young, was attached to Mr. Ernest Giles' expedition from South to Western Australia in 1875, a record of which was published in the '*Journal R. G. S.*' (vol. xlv. p. 328), illustrated by a map of the route. On that occasion he assisted in making an interesting collection of plants, and during his present journey he will, no doubt, obtain much botanical and geological information concerning a large tract of unknown country.

Italian Government Surveys.—The general topographical survey of the kingdom was commenced at the end of the year 1861, under the care of the General Staff of the Italian army; it has been since continued by a special department entitled the Military Topographical Institute, with central offices at Florence. The triangulation of the ex-kingdom of the two Sicilies was completed in 1873, and since that time the general triangulation of Italy has been undertaken, commencing with Piedmont. This great work is to be utilised in the preparation of a map of Italy on the scale of 1:100,000. First and second class surveys are being carried on during the present year in Piedmont, Lombardy, between Leghorn and Civita Vecchia, in Sardinia and other parts, and are expected to be completed in three years. Besides these, much survey work has been done in aid of the determination of the European level. The Institute published in 1878 a complete map in photo-lithography of the province of Naples and Sicily, in 174 sheets, on the scale of 1:50,000, with elevations represented by contour lines of 10-metre gradations. A large map of Italy is also in a forward state, intended for publication in photo-gravure by Avet's process. This is to be completed in 277 sheets, on the scale of 1:100,000. The Hydrographic

Survey, under the charge of the Minister of Marine, steadily progresses. The whole Adriatic coast has been completed; in 1877 the survey was extended to Calabria and Sicily, and in 1878 to North Sardinia. Besides many provisional charts, sixteen sheets of a coast-map have been published, on the scale of 1:100,000. The River Hydrography, roads, railways, &c., are under the charge of the Minister of Public Works, reports on the subject being published in the 'Hydrographic Bulletin.' We are indebted for the foregoing details to Professor G. Dalla Vedova.

The Present Condition and Future Management of Forests in Cyprus.

—The great necessity of trees to the welfare of Cyprus, and the influence they must exert on the fertility, the climate, and not only the rainfall, but also on the preservation and more equal distribution of water, give considerable interest and importance to the official report of Mr. A. E. Wild, Deputy-Conservator of Forests in India, on the forests in the south and west of the island. After a few general remarks, Mr. Wild proceeds to examine in some detail the extent and condition of the forests of the Olympus Range, which in the lower region are composed of very irregular *Pinus maritima* of all ages mixed together, dwarf oak, and arbutus; while the more elevated portion of the Troodos, above 4000 feet, is clad with a thin spoor forest of *Pinus laricio*. As the result of his investigation of these forests, Mr. Wild arrives at the following conclusions:—1. That they have been much reduced in area and thrown back on the more inaccessible spots through extension of vineyards and cultivation. 2. That, in the absence of control and proper supervision, and perhaps also for the gain of revenue, too great exactions have been made on the forests; indiscriminate fellings have taken place everywhere, and no regard has been had to the class of tree felled; reducing a once fairly-covered, closed, and regular forest to an open, scattered, and most irregular one, and causing not only a diminution and deterioration of the area of the forests and of the growth of the trees themselves, but also a deterioration of the soil through exposure to heat and atmospheric influences. 3. That the prevalence of fires and the extension of cultivation have greatly tended to reduce fine growing forests of all ages to a bare and barren spot. 4. That the wasteful method of extracting resin has had a most prejudicial effect on the forests. Lastly, that the establishment placed in charge of the forests is utterly inadequate to protect them efficiently.—The condition of the outlying forests is equally unsatisfactory, so far as Mr. Wild was able to see. In descending towards the coast, again, from Maschera, viâ Heptagonia, to Limasol, the forest becomes thinner and thinner as the plutonic rocks are left behind, finally ceases altogether, and gives way to barren hills, with here and there a plot of ploughed-up land, covered with stones, alternating with patches of waste land which produce nothing but *Pistacia lentiscus*, *Poterium spinosum*, and *Palæstrina*, *Cistus creticus*, and such like dwarf shrubs and thorns. In the streams are found

Tamarix, *Nerium oleander*, *Platanus orientalis*, and a few *Alnus orientalis*; around the villages are walnuts, almonds, carobs, olives, oranges, and figs; while nearer the coast there is a large expanse of carobs (*Ceratonia siliqua*), under which cultivation is carried on. Mr. Wild calls especial attention to the almost incredibly wasteful manner in which fellings have been carried on. If a native, he says, cuts a tree down, and it does not suit him, he at once fells another, and leaves the former to rot on the ground. It is incredible, but yet a fact, Mr. Wild believes, that to obtain the branches, the inhabitants will fell fine trees, and leave the trunks to rot on the ground. Reckless waste also takes place in procuring timber for kneading-troughs, yokes for oxen, rafters, &c. Having described the former mode of managing the forests, Mr. Wild devotes the concluding part of his report to the details of a scheme for their regeneration, which, if carried out, will, no doubt, gradually have a most beneficial effect on the climate and sanitary condition of the island, and also increase the producing power of the soil.

Obituary.

David Hopkins.—The last mail from West Africa brought us news of the death of this active and meritorious public servant, so long known as British Consul at one or other of the foreign ports of Western Africa. He was elected Fellow of our Society in 1869, and throughout the period of his membership availed himself of every opportunity that offered to promote its interests. Being Consul at St. Paulo de Loanda in 1875, at the time of the arrival of Lieutenant Cameron on the coast after his journey across the African continent, Mr. Hopkins devoted himself with great zeal and goodwill to help our traveller in the arduous task of providing for his large party of Zanzibar followers, and making arrangements for their shipment round the Cape to their native country. Mr. Hopkins was known throughout the West Coast as Captain Hopkins, deriving his military title from his connection with the 41st Middlesex Rifle Volunteer Corps, of which he was appointed captain in 1866. About this time he held a temporary appointment at the War Office, but failing to obtain a permanent clerkship, he went out to try his fortune in West Africa, where we find him officially recognised as Acting Consul at Fernando Po in 1870, which office he continued to hold till the end of March 1872. He received his appointment as Consul at Loanda in February 1874; his jurisdiction embracing the whole of the Portuguese possessions extending along the coast from Cape Negro to the Congo, and including the islands of St. Thomas and Principe. During his tenure of this important consulate occurred the difficulty with the pirate tribes of the Lower Congo, and he was present at the attacks made by our squadron on their strongholds in September 1875. In January 1878 he was appointed Consul at Fernando Po, with duties which extended to the quarrelsome native tribes of the neighbouring coasts of the Bights of Benin and Biafra. So indefatigable and successful was he in arranging these disputes, which often arose from disputed succession to the chieftainship of the tribes, that he earned the *soubriquet* of "King-maker" among traders and natives along the coast. It was during one of his numerous visits to the mainland on public duty that his death occurred on the 13th of September. He died at Bonny, on his return from New Calabar, where his presence had stopped a conflict between the native chiefs.

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION—SHEFFIELD MEETING.

(Concluded from p. 685.)

Monday, August 25th, 1879.

Afghanistan; the Jalalabad Region. By W. SIMPSON.—The author, in the exercise of his profession as artist, accompanied the Peshawur field-force under Sir Samuel Browne as far as Gandamak, and availed himself of the long stay of the troops at Jalalabad to make explorations in the neighbourhood. These, however, were archæological rather than geographical. He found abundant remains of the flourishing Buddhist period in the Jalalabad Valley, and Major Cavagnari supplied him with a working party to make excavations at one of the large mounds of ruins, the *Ahin* Posh Tope, about a mile south of the city. Penetrating by means of a tunnel, cut for about 45 feet through solid masonry, he found along with what were most probably the ashes of some Buddhist saint, twenty gold coins, seventeen being Bactrian or Indo-Scythian, and three Roman. Among other discoveries, the author believes he detected the site of *Nagarahara*, the Buddhist capital, about four miles to the west of Jalalabad.

Afghanistan; the Kurram Valley. By Captain GERALD MARTIN.—The author (writing from Paiwar Kotal) reported on the survey operations conducted by Captain Woodthorpe, Captain Martin, Lieutenant Manners Smith, and himself, officers attached to the Kurram column. We published this important paper *in extenso*, *ante* p. 617.

Afghanistan; Country between Candahar and Girishk. By Captain R. BEAVAN.—This paper (sent from Candahar) described the country between Candahar and Girishk, which was traversed by the division under the command of Major-General Biddulph in January and February 1879. Girishk, on the right bank of the River Helmund, is of great importance as a military position, because it lies at the extremity of the vast mountain masses that break up the whole country between the Helmund and the Arghesan into a troubled sea of rock. Skirting the route to the south lies the great sandy desert, equally impassable for troops. Thus the tract from Girishk to Candahar forms practically the sole military passage between India and Persia. It is for armies what the Suez Canal is for ships. The narrow strip of plain which this route traverses forms the interval between the desert and the hilly country. The desert rolls up in undulating sandhills from the far south. It is bounded by the rivers Arghandab and Dori, the thin lines of running water seeming as if they had some magic influence in restraining the overflow of the sand. To the north are the mountains, bare and rugged, not a sign of verdure anywhere about them, not an indication of moisture. The great peculiarity of the country is that only the upper portions of the hills are exposed. The whole country, including the lateral valleys, appears to have been filled up at a date subsequent to the elevation of the hills with a deposit of rubble, water-worn boulders and pebbles, with hardly sufficient soil to hold them together. The elevation of this part of the country is over 3000 feet above the sea. This deposit, though apparently level, in reality slopes considerably upwards from the rivers to the base of the hills, while the valleys have a slope in the direction of their length. Captain Beavan then explained how this formation aided the peculiar system of irrigation by means of *karez* or underground aqueducts, which is constantly made use of in this part of Afghanistan. At the junction of the two rivers Helmund and Arghandab, and from this point along

the banks of the Helmund to a considerable distance above Girishk, are scattered the remains of numerous forts and entrenchments, showing the importance that has always attached to this part of the Helmund River. Girishk itself is simply a fort, commanding the Herat road. There is no town near it, but the whole of the Helmund valley is full of small, scattered villages, with gardens, trees, and fields. To the north-west from Girishk, by the Herat road, the country is mountainous, and again towards the north-east, but in a northerly direction it appears quite open and level as far as the eye can see. The only exception is that, on very clear mornings after rain, a few snowy peaks are visible, just showing their tops above the horizon. Captain Beavan found the old position of Girishk fairly correct.

Afghanistan; The Pishin Valley. By Lieutenant ST. GEORGE C. GORE, R.E. —The author (writing from Gulistan, in Pishin) described the Pishin Valley, which is now to be annexed by the British Government. Its extreme length is about 48 miles, and its average width, including the hill ranges on either side, from 25 to 30 miles. Its two sides are formed by the parallel ranges of the Khojah Amran on the west, and the Mashalak-Ajirem (or Ghazarband Range) on the east; the southern end being shut across by spurs of hilly ground which separate Pishin from Shorawak. The upper end of the Pishin Valley is shut in by the high plateau of Toba on the north, and the ridges running between the Kand and Takatu mountains on the east. The valley of Pishin is a perfectly open, nearly flat alluvial plain, with a very barren aspect owing to the absence of trees, except fruit-trees in a few gardens. The author described the Khojah Amran Mountains bounding the Pishin Valley on the west, which are but a spur of the Sulimani Range, the water-parting being continuous and well marked from the Kand Peak along the southern edge of the Toba Plateau and thence down the Khojah Amran Range. He also gave full details respecting the River Lora, which waters the Pishin Valley, and its affluents; the irrigation system by means of *karez*; the passes over the mountain ranges; and the inhabitants of the valley.

Afghanistan; Shorawak Valley and Toba Plateau. By Major CAMPBELL, R.E. —The Shorawak Valley had never been visited by Europeans before the recent campaign. It is a narrow strip of flat country lying between the desert on the west and north-west, and a range generally known as the Sarlat Hills to the east. Its total length is about 40 miles, with a width of 10 miles at the northern end; and it is 3250 feet above the sea. The head of the valley, to the north, is closed in by the southern spurs of the Khojah Amran range of mountains, which nearly join the north-western spurs of the Sarlat Hills, only leaving a gap of about a mile through which the Lora River runs into the valley. The desert, which stretches away westward as far as the Persian frontier, rolls up in the form of sandhills to the edge of the cultivated land of the valley. The Lora River, which waters the valley, runs nearly dry in summer, and its water is always brackish, whence the name of the valley from the Persian words *Shor* (brackish), and *Abak* (scarcity of water). The valley is thickly populated, and crops of wheat and barley are raised. Major Campbell suggested that Shorawak was once a lake, which was gradually silted up by deposits from the Lora, and this seems to account for most of the phenomena. The river, after flowing through the valley, is swallowed up in the sand of the desert. The Toba tableland is at the north-eastern extremity of the Khojah Amran range of mountains. It was visited by Major Campbell last May. The crest of the Khojah Amran bifurcates at a short distance north-east of the Khojak Pass, one line running nearly due east, and the other about N.N.E. Between these two crests there is an elevated mountain mass extending eastward until it merges in the general confused mountain system in that direction. This tableland is divided into two

portions, called Toba and Tabin; the former on the southern and eastern edge, the latter on the western side. They are separated by a narrow line of hills, running about N.E. by E. The general elevation is over 7000 feet. It will probably form an excellent hill sanatorium for the troops stationed in the Pishin Valley.

Afghanistan; New Routes to Candahar. By Captain HOLNICH, R.E.—In weighing the capabilities of the various passes now known to exist in the mountain barrier of Western and North-Western India, with the important political and strategical object of selecting the best main route to Candahar, the author commenced by stating his objections to those in use at present. Admitting that Karáchi (Kurrachee) may prove the best base for communication with our frontier posts as they stand at present at Quetta and Pishin, he considered that the direct Sonmiani route, connecting the coast with Biela, Kalat, and Quetta, though passing through a friendly country, would be too great a burden to maintain, as it traverses a wild, unproductive, and most unpromising region. The Jacobabad-Bolan route, on the western side of the Indus, is also open to the periodical danger of inundation by that river (resulting last year in the isolation of Jacobabad itself from Sukkur by 38 miles of water), and to the restriction of its use to cold weather, owing to the painful and disastrous effects of crossing the Kachi Desert in the hot season. The journeys, however, of the native explorers, instructed by Colonel Browne, through the previously unknown district lying between the Quetta-Pishin line and the Sulimani Range, resulted in the accumulation of material sufficient to warrant the march of a column under General Biddulph from Candahar eastwards towards Dera Ghazi Khan, which has been selected as the base on the Indian side on account of its proximity to Múltán on the Indus Valley Railway, and its avoiding a desert passage to the hills. The object of this march was to investigate the various practicable caravan and other routes said to exist between the Pishin Valley and Dera Ghazi. Starting from Kushdil Khan, at the eastern end of the Pishin Valley, this expedition reached Bolozai, in the Surkab Valley, by crossing the Suranari Pass, and here were discovered two great rivers, the Zhob and Bhoi, radiating eastwards through open valleys, and affording the finest openings for a route to India. The Zhob, which trended too much northwards, was not followed, but apparently would strike the frontier ranges at the Gulere (or Gomul) Pass. The Bhoi Valley was reached from Bolozai by following the bed of the Surkab River by Yusuf Kutch to the Ushtára Pass (a wide and convenient one), the sandstone hills culminating at Mashkwar in grand and vividly-coloured scenery, contrasting strongly with the usually tame aspect of the Candahar region. Thence, from Chimjan through the Bhoi Valley to Anumbar, the road recalled the “Lombardy plains.” Part of the expedition turned southwards at Katz, viâ Smalan and Baghao, with the intent of exploring the Thal and Chotiali route; but the main party kept the straight road, following the river to Anumbar, and reached the Chimalang Valley by the Treek Kurram Pass, whence they struck south among winding precipitous ranges to Baladaka, eventually arriving by the Han Pass and Ilasni Kot to the valley of Luzari Barkan. This valley is open to the Kaho Pass by Vitakri, and reaches the Derajat Plain about 40 miles south of Dera Ghazi. All this road is capable of easily carrying a railway, and as it now is will exist for ever; it could be shortened by not striking south at the Treek Kurram Pass, but keeping eastward and south-eastward on the Karwaddi route viâ Rakni to the Fort Monro or Sakhi Sawar passes, opening opposite Dera Ghazi. The party that followed the Thal and Chotiali route also reached the Lugari Barkan Valley, but no good direct route could be found between Thal and Vitakri, which is a desirable position at the head of the Chachar Pass. The chief addition to our knowledge from this expedition was that

the hitherto unknown region between the Pishin Valley and the Sulimani Range was found to be open, rich, and fertile, with nothing in its physical characters preventing travel across it in almost any direction.

Afghan War; Surveys round Candahar. By Major MALCOLM ROGERS, R.E.—The author (writing from Candahar) gave an account of the recent survey operations in Baluchistan and Southern Afghanistan. During the march to Candahar the work was restricted to a route-survey of the immediate line of march; and the careful survey made during the former Afghan war by Lieutenant Durand, R.E., was found to be very correct. Major Rogers, however, connected his work near Quetta with points on the Khojah Amran range of mountains, and thence fixed points on the great plain stretching from the mountains to Candahar. He climbed the highest hill of the range, whence its name is derived, which is 8960 feet above the sea. Between the Khojah Amran Mountains and Candahar there is a vast plain, with numerous detached hills and ranges, mostly of limestone. There is little water, and the general appearance is treeless and barren. To the westward this plain is bounded by a vast desert of rolling sandhills. The River Dori is the only perennial stream in this plain. The author accompanied General Stewart when he advanced from Kalát-i-Ghilzai, and carried on a route-survey; but the division followed on the track of the army of 1839, and there was not much to add to former work. The troops advanced up the valley of the Tanak, the river being rapid and muddy in January, and having cut for itself a deep winding channel. There were many villages on both banks. During the stay of the army at the fort of Kalát-i-Ghilzai, the surrounding country was mapped. When the troops returned to Candahar, arrangements were made for small columns to march back by the valleys of the Arghesan and Arghandab. Thus 50 miles of the courses of these two rivers above Candahar were surveyed. A trigonometrical survey of the country for 12 miles round Candahar was also executed; and an expedition was sent into the Khakrez Valley, about 30 miles north of the city. It drains into the river Arghandab, from which it is separated by a range of low hills. The longitude of Candahar was fixed by electric telegraph.

In summing up the results of the foregoing series of papers, the PRESIDENT said they gave them a complete history of recent discoveries in Afghanistan. It appeared to have been the idea of the Government that there were three entrances into India on the north-west, and that if these passes were blocked up India was safe. It now appeared that the whole country from Jalalabad to the Bolan Pass could be crossed in almost any direction, and that the several roads were perfectly free and open except where they debouch on the Indian plains. Therefore, it seemed futile to suppose that India could be made safe by merely occupying two or three separate passes. There must be a continuous frontier somewhere or other from north to south, with lateral communications along it.

On the Orography of the North-West Frontier of India. By TRELAWNY SAUNDERS.

Imperial Survey of India.—By J. O. N. JAMES, Esq., Deputy-Superintendent of the Surveys of India.—The object of Mr. James's paper was to sketch out, in a concise manner, the nature of the work in progress and already performed by the Indian Survey Department, and to point out its practical utility. The Imperial Survey of India, up to a late period, consisted of three distinct branches, namely, the Trigonometrical, Topographical, and Revenue Surveys. The Trigonometrical Survey, besides its purely scientific work, furnishes the great basis by principal triangulation for the origin and extension of detail surveys executed by the Topographical and Revenue Branches. Already the whole of India is covered with principal triangula-

tion, which, for scientific accuracy, is unsurpassed by any similar undertaking in the world. To the Topographical Branch is assigned the labour of executing geographical surveys of native States and hilly or forest tracts in British territory, usually on a scale of one inch to the mile. Mr. James described the methods adopted in the execution of these topographical surveys, and pointed out the vast amount of geographical information which is collected by the surveyors. During the administration of Sir Henry Thuillier, late Surveyor-General of India (1861 to 1877), an area of not less than 290,000 square miles was surveyed and mapped, including the wildest and least known tracts of India. This enormous area, more than double the size of Great Britain and Ireland, was surveyed in sixteen years, at an average cost of 2*l.* the square mile.—The Revenue Survey operations are chiefly confined to open and well-cultivated districts in British territory. They furnish complete and accurate records of the area and boundaries of every village and district. They show the extent of waste and cultivated land, the nature of the soil, and the principal features of the country, on a scale of four inches to the mile. From these original surveys excellent maps of complete districts are completed on various scales, for general administrative purposes. In some special districts the system of cadastral field surveys has been introduced. During Sir Henry Thuillier's superintendence (from 1847 to 1877) an area of 493,000 square miles was completed on the village survey system on a scale of four inches to the mile, and 12,281 square miles by cadastral measurement on a scale of 16 and 32 inches to the mile; making an aggregate of 505,574 square miles, considerably more than double the area of France. The Revenue Surveys comprise a great portion of Bengal and Assam, all Oudh, part of the North-West and Central Provinces and Bombay, nearly all the Punjab, and all Sind.—In further commenting on this work, the author said that it had not been accomplished without the sacrifice of many valuable lives, and the necessity of facing dangers and hardships of no common kind. The zeal and devotion of the Indian surveyors were beyond all praise, and their work has been and continues to be most valuable. It must, however, be clearly understood that a considerable portion of what has been accomplished by the Topographical Branch of the Department is nothing more than a "first survey," rapidly executed, for geographical and general administrative purposes. Hereafter, more rigorously accurate and complete surveys will be needed. Meanwhile there is not a single official in India who does not possess maps of the portion of the country included in his jurisdiction, which are suited to every present requirement. The maps issued by the Surveyor-General's Department are also utilised by engineers in the construction of public works, by the foresters for conservancy purposes, by mining companies, planters, holders of estates, and by every branch of the civil and military services for purposes too numerous to detail.

Three Months in Cyprus. By J. BROWN, C.E.—The author had been engaged in Cyprus making preliminary surveys, and he had travelled over the greater part of it. He referred to the agriculture of the island, its inhabitants and the climate, and called attention to the fact that there is no accurate map of the island. He recommended the completion of the trigonometrical survey (which was commenced, but had been suspended), a geological survey, and systematic meteorological observations. He further urged that the means of communication in the island should be improved by the making of new roads. He also recommended an extensive drainage system, with the view of eradicating malarious disease. He had no hesitation in saying that the future of Cyprus depended on a plentiful supply of water for irrigation. As to the sanitary condition of the island, he said it must be conceded that fevers were common in the island. The sanitary state of the villages was bad, and that of the large towns very little better. No system of drainage

existed, but there were abominable open cesspools. He did not think the sanguine views entertained at the outset of the occupation with respect to the mineral resources of the island were justified. He urged, in conclusion, that England should free Cyprus from all connection with Turkey, believing, as he did, that the island in the future, in the event of complications, might become very useful, strengthening our position in the Mediterranean, and ensuring command of the Suez Canal.

In the discussion which followed, Mr. HEPWORTH DIXON said he was glad to find with regard to Cyprus, that they were growing out of parish politics. He described the scene, from on board ship, of the coast at Larnaka Marina as most charming; yet a young midshipman by his side direct from Portsmouth, said he thought it was "a howling wilderness." Mr. Dixon believed that in Cyprus we had opened up a field which, in a political and military sense, was of first-rate importance. He reminded the Section that the death-rate in Cyprus during the past year was not equal to that of Malta.

Italian Explorers in New Guinea. By Professor GIGLIOLI. — Much scientific work in New Guinea has been done by Italian explorers, while a very great deal still remains to be done, the high chain of mountains running through the length of this great island being yet quite unknown. Professor Giglioli, of Florence, in this paper gave some account of the labours of Italians in this field of research. The first Italian who ever visited New Guinea was the Count Carlo Vidua di Conzano, in 1830, who went to Triton Bay in a Dutch vessel. In 1869-70 Colonel G. di Lenna, a distinguished military officer, and G. Emilio Cerruti reached the south-west coast of Papua, but were treacherously attacked by the natives on the north side of MacCluer Bay. A survey was made by them of Galewo Straits. Dr. Odoardo Beccari and Signor L. M. D'Albertis, in 1872, reached an island in Galewo Straits, whence they made excursions to the mainland of New Guinea. They afterwards explored the Arfak Mountains, the home of the birds of paradise; but D'Albertis was attacked with fever and obliged to retire to Sydney. Meanwhile Beccari visited the Aru and Kei Islands. These two travellers made very important botanical and zoological collections, including a new bird of paradise. In 1875 Dr. Beccari started on his second visit to New Guinea, with generous aid from the town and provincial councils of Genoa. Hiring a schooner at Amboyna, he landed at Dorei-Ham, ascended Mount Morait to a height of 3500 feet, and obtained a view of the largest river in the northern peninsula of New Guinea. He afterwards reached its banks, and found that it flowed from the Arfak Mountains to the north-west coast. Beccari then explored the whole curve of the wide Geelvink Bay, and visited the islands in it. He also again visited the Arfak Mountains, attaining a height of 7000 feet, and ascertaining that the highest peaks reached 9500 feet. He returned with immense natural history collections. Signor Albertis, after a long stay in Australia, set out on a second expedition to New Guinea in 1875, intending to visit the south coast, and to penetrate into the interior by one of the large rivers. He was accompanied by a young Genoese named Tommasinelli. They reached Yule Island, whence they made several excursions; but afterwards endured much from sickness and want of food, and Tommasinelli was obliged to return home. After again visiting Australia, D'Albertis joined the English missionary party under Mr. Macfarlane, in their expedition up the unknown Fly River. That river was ascended for 150 miles. Returning to Sydney, he met with liberal support, and was provided with a steam launch. In this small craft he entered the Fly River in May 1876, and ascended it for about 500 miles, planting his flag nearly in

the centre of New Guinea. In 1877 he once more entered the Fly River, but the natives had become hostile, and after encountering great dangers he reached Mount Ernest Island in Torres Straits, on January 1, 1878, having been deserted by all his crew, except the English engineer and a boy. He made very large botanical, zoological, and ethnological collections, which are of great value. The Italian explorers in New Guinea have brought home about 5000 specimens of plants and nearly 100,000 of animals, of which 10,000 birds and 80,000 insects have been deposited by Beccari and D'Albertis in the museums of Genoa and Florence.

Tuesday, August 26th.

On the Unsurveyed Coasts of the World. By Lieutenant G. J. TEMPLE, R.N.—Public attention has been lately drawn to the unsurveyed state of parts of the coast of South Africa, and to the fact that they have not been sounded for half a century, by the grounding of H.M. ships *Active* and *Tenedos* on some unknown reefs. Inquiry is thus directed into the present state of the surveying branch of the Navy, with a view to the prevention of similar disasters in the future. The story of this essential branch of the public service is both interesting and instructive. From an insignificant beginning, and after many struggles and reverses, it advanced slowly but surely, until the year 1849 found twelve surveying ships in commission, under the late Sir Francis Beaufort, while twenty-three officers were borne on ships' books for detached surveying service. When Sir Francis retired in 1854, he left a surveying force of nineteen captains and ten commanders, with sixteen lieutenants in training and eight ships in commission, although we were then at war with Russia, and although three surveying captains and two commanders were employed in Arctic service. Instead of progressing, or even maintaining its position, the surveying service has since then been allowed to decline, and by the middle of 1873 it had fallen so low that only *one* of H.M. ships was engaged in actual surveying duties. In the meantime, however, the annual naval expenditure had increased from about $4\frac{1}{2}$ to $7\frac{1}{2}$ millions, and the tonnage of the mercantile navy from less than $4\frac{1}{2}$ to upwards of 7 million tons. During the last few years matters have somewhat improved, but we still find a decrease of ships and men where there should have been increase. As regards home work, also, the Hydrographical Department is unequal to the demands upon it. Unpublished information is steadily increasing in consequence of insufficiency in funds, and the Department is also mechanically too restricted in space. At the present time there are five regular surveying ships in commission, while detached parties are doing their best with small craft and hired steamers, or with hired boats and crews. The absence of naturalists in the surveying vessels is a matter of great regret, and in other respects an amount of economy is now enforced which impairs efficiency. The detached system of nautical surveying, though undoubtedly cheap, and of some value as an auxiliary force, has several disadvantages. We lose that best of all schools for surveyors and practical seamen, a ship, and the disciplined life of a man-of-war; and the officers thus employed cannot always get small craft wherein to obtain soundings, without which the rest of their work is almost useless. An enormous amount of work remains to be done in the examination and charting of the seaboard in various parts of the world. Attention is specially called to the West Indies; the east and west coasts of South America; the Pacific coast of Central America; the Sandwich Islands; Fiji Islands; New Zealand; Tasmania; Australian Colonies; the routes between Australia and China or Japan; the China Seas; the coasts of China or Japan; the west coast of the peninsula of Siam; the east and west coasts of Southern Africa, including the Cape Colony; the inner channels of the Red Sea, and several parts of the Mediterranean. The diversion of a

great stream of commerce from the Isthmus of Panamá to the Straits of Magellan; our increasing trade with Chili, and with the Pacific ports of Central America; the numerous unsurveyed channels and doubtful dangers between South America, Australasia, and those great seats of industry, China and Japan; the increasing importance of Africa; the traffic through the Suez Canal; the political interest attached to some of the unsurveyed coasts of the Mediterranean; and the greatly increased tonnage of the Mercantile Navy, all point to the necessity for extending the sources of hydrographical information. The success of Professor Nordenskiöld, and the large quantities of timber and iron imported from Norway and Sweden, prompt inquiry into the state of the Scandinavian seaboard. Excellent charts for the coast of Norway, the connecting link between Europe and Siberia, have been published by the Norwegian Government, but are not reproduced by our own. Hydrographical information, in short, is urgently needed by our merchants and by their fleets, while the fate of the *Independencia*, and the narrow escape of the *Active* and *Tenedos*, clearly show that it is required by our Navy. Lieutenant Temple earnestly appealed for the restoration of the Surveying Service to the prominent position it ought to hold among the forces of civilisation, and for its protection in some measure from the restraint of an ill-judged economy. He considered that by increasing the number of surveying ships, and extending to navigation and nautical surveying a fair share of the encouragement so freely bestowed on shipbuilding and great-gun founding, a first-rate finishing school could be established, which would produce not only nautical surveyors, but superior officers for the general service; and, by giving naval officers the opportunity of practising afloat what they learn at Greenwich, they would be enabled more efficiently to protect the trade they would be helping to extend. The paper concluded with the expression of a hope that before long the commander-in-chief of every station would have a properly equipped surveying ship at his disposal, and that the Hydrographical Department might be extended to enable it to keep pace with the wants of the times, and to publish and circulate its stores of information.

An animated discussion followed the reading of this paper:—The PRESIDENT said great loss of life and property resulted from the neglect of surveys, and it was an astonishing fact that there were actually accurate surveys of coasts frequented by our ships which were available to foreign seamen, but not to English merchantmen. He thought this fact ought to be generally known. High insurances were charged in many cases owing to want of survey.—Captain F. RUXTON, R.N., said, considering our enormous marine, with two-thirds of the carrying trade of the world, it could hardly be held that we spend enough on our surveys and other business connected with our Hydrographical Department. It would be cheaper in the long run than having to pay higher premiums of insurance. It was his lot to be sent on one occasion to the River Bonny, on the West Coast of Africa. At that time the trade of the river was at least 150,000 tons of shipping a year. This place was not thoroughly surveyed, and insurance was consequently high. He pointed out this about Bonny and other rivers, and he now found that the place is fairly correctly laid down. They all knew Hudson's Bay. That was marked unsurveyed. Now, it was of the greatest importance that an accurate survey be at once prepared of the southern extremity of this great bay, where the Nelson River runs into it. The Nelson River debouches from Lake Winnipeg, and is only some 270 miles in length; in communication with Lake Winnipeg was the great Red River, and on that river are the largest farms of wheat that the world has ever seen. There was one of 6 square miles under wheat of the finest quality; so that this surveying question could be brought home to all; it meant cheap bread.—Sir RAWSON RAWSON said, as a civilian, he could illustrate Lieutenant Temple's paper. When he went to the Cape in 1854 he found an

Admiralty survey in progress upon the eastern coast in the neighbourhood of Cape Agulhas, where the *Birkenhead* was lost, and where scores of ships and thousands of valuable lives lie buried under the waves of that dangerous shore. There Admiral Nolloth, whom he saw present now, was engaged, and could vouch for what he said. When he left the Cape, in 1864, the survey was still dragging its slow length along, so slowly that in 1879 it had not reached Natal, where two of H.M. ships, as Lieutenant Temple had pointed out, ran aground for want of a proper survey.

The Section approved the action of the Committee in recommending the Association to print Lieutenant Temple's paper *in extenso* for circulation, and Mr. T. SAUNDERS suggested that a copy, in the annual Report, should be sent to the First Lord of the Admiralty.—The publication of the paper *in extenso* was afterwards sanctioned by the General Committee of the Association.

Arctic Research. By Commander L. A. BEAUMONT, R.N.—The author maintained that, in spite of the unfortunate controversies which followed the return of the late Arctic Expedition, the discovery of the unknown would never be permanently abandoned, and the Arctic regions, in common with the rest of the world, would surely be discovered and explored. The author addressed himself chiefly to the question, Which route affords the best promise of geographical and scientific discovery? Franz-Josef Land seemed, at first sight, to fulfil the conditions required to ensure success. Here the land extends far to the north, and if any part of the shore could be reached by a ship, a sledging party might certainly attain to the 86th parallel. But the disadvantages of the route are, that it is uncertain whether a vessel could reach the land, while there would be no alternative after starting but to succeed or fail. If the main object were not gained, no lesser useful work could be done. The next route, in Commander Beaumont's opinion, now that the North-East Passage has been achieved, was the exploration of the land about Cape Britannia, proceeding by way of Smith Sound: that is—the discovery of the northern side of Greenland. He preferred this route to an attempt along the eastern side, because a higher latitude can be reached by Smith Sound; and believed that a vessel might winter on the eastern shore of Robeson Strait, and advance depôts to Repulse Harbour in the autumn. He had seen Cape Britannia, the most northern known point of Greenland, and believed that to stand on its highest peak would alone throw much light on Greenland geography. He then submitted calculations, derived from his own experience, of the time that it would take for a sledge party to reach Cape Britannia, and discussed the nature of the ice; concluding by offering several valuable suggestions for improved appliances in travelling over soft and deep snow.

On the Interior of Greenland: the principal points of Geographical Interest connected with it, and the recent Expeditions for its Exploration. By Dr. H. RINK.—The author estimated the area of Greenland to be 512,000 square miles. It is wholly covered with ice, except, perhaps, where some barren highland may penetrate the glacial surface, and is constantly engaged in the formation of material for icebergs, which probably take one hundred years to travel from the presumed central water-parting to the heads of the fjords where they fall into the sea, but only at certain points. In one of these ice-fjords the portion of glacier annually pushed in, and representing the annual surplus from an extensive area, has been calculated to constitute a cubical body 900 feet high, 2 miles long, and 2 miles broad. The investigation of the interior is of special interest to physical geographers, owing to the peculiarity that the whole system of river drainage is represented by a continuous sheet of ice. It has, since 1875, been taken in hand to some small extent by the Danish Government, which has in 1876-78

annually voted 550*l.* for scientific work there, mainly with the object of completing the coast-maps in connection with the geological survey. In the course of these operations explorations were extended over the border of the inland ice. In 1876 the geologist Steenstrup, with Lieutenant Holm and Mr. Kornerup, travelled over the Julianshaah district, between 60° and 61° N. lat.; in 1877 the investigations were continued by him and Lieutenant Jensen between 61° and 63° N. lat.; and in 1878 the expedition was divided, Jensen, Kornerup, and Mr. Groth exploring the coast between 62° 30' and 64° 30' N. lat., and Steenstrup, who has not since been heard from, turning to the more northern regions between 70° and 72° N. Lieutenant Jensen's party, in July 1878, crossed the inland ice in 62° 30' N., in the endeavour to penetrate as far as possible into the interior. The object was to reach certain iceless mountain-tops, called Nunataks, emerging in the distance from the surface of the glacier, and which more than a century ago had been ascended by a Danish trader. These were reached after a march of more than forty miles in a straight line across the ice. On the lower of these Nunataks the roughness of the surface of the ice was very great, being traversed by yawning chasms divided by steep and slippery elevations, and cut by watercourses disappearing as cascades into the crevasses. The party consisted of four, one of whom was a Greenlander, drawing three small sledges, and generally tied together by a rope. After many perilous adventures they reached the foot of the hills, the view from the summit of which was obscured for a week by snowstorms and mist. On the weather clearing, a successful ascent was made, the elevation being found to be 5000 feet. The ice waste of the interior was found to rise very slightly inwards, without visible interruption. In the present year Jensen, Kornerup, and Lieutenant Hammer have been sent on a coast survey between 67° and 68° 30' N. lat., of which part very little is known.

Indian Marine Surveys. By CLEMENTS R. S. MARKHAM, C.B., F.R.S., &c.—The Indian Navy created a splendid staff of surveyors, and many admirable marine surveys were executed by them before the abolition of that useful service in 1862. But from that time, during a period of twelve years, all marine surveys on the coasts of India were absolutely stopped. Meanwhile trade increased, more especially the coasting trade, and new ports were opened to facilitate the export of coffee and other products. While the Government utterly neglected the duty of making the approach to Indian coasts and harbours tolerably safe, the urgent need for correct guides to navigation became each year more and more apparent.—These facts were earnestly represented to the authorities both at home and in India in 1871 and succeeding years, and at length the creation of a Marine Survey Department was sanctioned, and Commander A. D. Taylor (late of the Indian Navy) was appointed Superintendent. The work was commenced in October 1875, but no suitable vessels have yet been supplied, and the work has hitherto been done by boat parties.—Captain Taylor makes annual inspection tours, by which means he has discovered many serious errors in existing charts, and has contributed largely to our knowledge of what is needed at the various ports around the coasts of India. Lieutenant Jarrad, R.N., conducts the actual surveys; and the construction of charts, the publication of notices to mariners, wreck returns, and lighthouse lists are entrusted to Mr. Carrington, the Chief Civil Assistant. A new steamer, called the *Investigator*, is now being built at Bombay, specially fitted for scientific surveying, and will be ready in 1880. A naturalist forms one of the staff of the Department; and when the new steamer is ready, and fitted with apparatus for deep-sea sounding and dredging, systematic scientific investigations will be undertaken. Useful results have been produced by the Department in a wonderfully short time. From the spring of 1875, when Mr. Carrington got his branch into working order, to 1879, as

many as eighty charts have been produced, or more than one each month, from which 11,400 copies have been photo-zincographed. Upwards of 15,000 charts have been corrected for new lights and buoys, and 20,000 copies of notices to mariners have been distributed. A very great improvement has also been made in the report of wrecks and casualties. A chart depôt has been established at Calcutta, where some 20,000 charts are shelved and numbered, and considerable sales are now being effected. This is an immense benefit to the merchant shipping in Indian ports, and the Department has also been able to supply H.M. ships when charts were urgently needed. The continued prosperity and efficiency of this useful Department is of the utmost consequence to the shipping and manufacturing interests of nearly all the maritime nations in the world, as well as to the people of India; and it is no less important to geographers who are supplied with accurate hydrographic information, and are thus enabled to obtain a sound knowledge of the physical geography of the Indian coasts.

The Exploration of the American Isthmus and the Interoceanic Canal of Panama. By LUCIEN N. B. WYSE, Lieut. French Navy.—The author passed in review the various routes that had been proposed and surveyed for a ship canal from Tehuantepec to the Atrato and Cupica Bay, and gave a short sketch of the line at Panamá surveyed by himself, which had been adopted by the recent Congress.

On Present Italian Geographical Explorations. By G. DALLA VEDOVA, Professor of Geography at the University of Rome, Secretary of the Italian Geographical Society.

Zululand and Natal. By BEAUCHAMP TOWER.

The proceedings of the Section terminated at half-past 3 P.M. by a cordial vote of thanks to the President.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—October 4th: Dr. NACHTIGAL, President, in the Chair.—The President greeted the members on their reassembling after the three months' vacation. Reviewing the geographical events of the interval, he first mentioned the arrival of the *Vega* in Japan and the prospect held out by Professor Nordenskiöld of the opening of the great Siberian rivers to the commerce of the world. He also alluded to the arrival at Hammerfest on its homeward voyage of the Dutch Arctic Expedition, which had succeeded in penetrating near to the shores of Franz-Josef Land. Regarding Count Széchenyi's Expedition in Western China, he said two letters had been received, dated July 11th and July 12th, 1879, in which he stated that he had been stopped in his attempt to reach Lob Nor by the Chinese Governor of Kansu, who declared it impossible to reach the lake by the route he was taking, but that he had subsequently overcome all diplomatic difficulties, and was starting for Kuku-nor under the protection of the Chinese officials, and with an escort of thirty soldiers; this result was due to the orders of the General Government in Canton and the Chinese Resident in Tibet. His route would lead him by Siming Shen-chung-chia and Tsaidam, 2000 li distant from Lhasa. All Chinese officials were ordered to aid him from stage to stage.—Turning to Africa, the President stated that two letters had been received from Gerhard Rohlfs, the first dated July 22nd from the Aujila Oasis, the other July 27th from the Oasis Batifal, the latter lying (according to Dr. Strecker's survey) much further to the east than appears on our maps. Rohlfs writes that the

presents from the Emperor of Germany intended for the Sultan of Wadai had reached him in good condition, and that in consequence of the energetic orders of the Turkish Governor of the vilayet Benghazi, the Suya Sheikh and the inhabitants of the oasis, who had before been so hostile to him, had changed their behaviour for the better; the friendly attitude of the Senussi fanatics had also produced a powerful impression on the people. Rohlf's was now planning the future course of the Expedition. Reports had been spread that Sultan Jussouf, of Wadai, intended to forbid its entry into his territory, and that he had sworn neither Turks nor Christians should be permitted to set foot there. Should these reports prove true, and the Expedition be turned back from the frontiers of Wadai, no alternative would remain but to proceed to Kuka or Bilma, which might be practicable with the help of the tribe of the Uled Sliman. Should the worst happen, and the Expedition be forced to turn back to the Kufara Oasis, he would make an attempt either to reach Mursuk via Uan, or to go from Aujila to Fezzan, and thence penetrate towards the south. At present the party remains at Kufara, detained by the Rhamadan holidays, and it would be forty days before they would be able to resume their march to Wadjanga. It was hoped Rohlf's would not abandon his task and leave the command to Dr. Strecker, as had been talked of. The long delay in waiting for the presents from Europe and the trouble with the sheikhs may well have tried the patience of this experienced African traveller, but his dissatisfaction would pass away when once again on the march.—In West Africa Dr. Buchner was preparing (July 21st) to resume his march towards the Lunda country, and Herr Schutt had returned to Europe with rich cartographic material.—The President then feelingly alluded to the loss Geography had sustained in the deaths of Mr. Keith Johnston and Dr. Mullens, and concluded by announcing that Dr. Osear Lenz, the well-known Gaboon traveller and geologist, was preparing to start on another journey under the auspices of the German African Society. His destination this time would be Morocco, where he intended to cross the Atlas and investigate the geology and natural history of the southern districts.

A paper was then read by Herr SCHUTT, who had recently returned from his journey of exploration in West Central Africa, undertaken on behalf of the German African Society. The paper was illustrated by a large number of remarkably well executed sketch-maps, which give for the first time an accurate representation of the region lying to the west of the Kassai tributary of the Congo, and north of Pogge's route.

October 11th. Meeting in Celebration of the Centenary of the Birth of Karl Ritter: Dr. NACHTIGAL, President, in the Chair.—A large audience was gathered on this occasion in the Society's Hall, which was adorned with a plaster bust of Ritter, the assembly including, besides members of the Society, representatives of the higher educational institutions, the University and Military Academy with which Ritter was connected, and delegates from most of the Geographical Societies of Germany. The proceedings were opened by the President, who in a short speech alluded to the great merits of Ritter and to the fact of his having been one of the founders of the Berlin Geographical Society in 1828, and one who contributed most to its growing prosperity in its earlier years. Dr. Marthe then delivered an address on the scientific position of Ritter as the creator of a new era in Geography. This concluded, Professor Brulins, of Leipzig, addressed the Berlin Society in the name of the other German Geographical Societies, and presented on their behalf a considerable sum as a contribution towards the cost of a marble bust of Ritter.

Geographical Society of Hamburg; Conference on Scientific Research in the Polar Regions.—October 2nd: Dr. KIRCHENPAUER, President, in the Chair.—The members of the International Polar Conference then about to sit at Hamburg

were invited to the meeting. Of those there were present Professor BUYS-BALLOT (Utrecht), Lieutenant WEYPRECHT (Austria), Captain HOFFMEYER (Director of the Meteorological Institute at Copenhagen), Professor MOHN (Director of the Meteorological Institute of Norway), Professor MASCART (Paris), Professor WYKANDER (Stockholm), Professor LENZ (President of the Geographical Society of St. Petersburg), Dr. NEUMAYER (Director of the German Marine Observatory), and Baron Schleinitz (representing the Imperial Admiralty of Berlin).—The President opened the meeting with an address, in which he first passed in review the chief geographical events of the past three months, dwelling more particularly on the great Arctic achievement of Professor Nordenskiöld, and the recent opening of the sea route to the mouths of the Ob and the Yenissei. He then, in special reference to the objects of the meeting, said that in future ships would be sent to the Arctic Seas not for mere purposes of adventure, or to reach the Pole, but to investigate thoroughly in the interests of physical science the lands that had been already discovered; and in this respect the Antarctic Seas would be explored as well as the Arctic. He understood that such were the views of their guests, and that they had assembled in Hamburg to discuss the direction that should be given to future Arctic Expeditions. —Among the speeches that were made we select the following as setting forth more fully the objects of this important movement:—Dr. NEUMAYER said that nothing less than fixed observatories at various points in the Polar regions, would satisfy the present requirements of science. In such departments as meteorology and magnetism it was absolutely necessary that a continuous series of observations should be made at one place, and in many places simultaneously. It was the opinion of the foremost men of science of our time that such observatories would render great service to all branches of science.—Lieutenant WEYPRECHT said that he could not claim the honour of being the first to suggest the formation of Polar observatories; this was due to Dr. Neumayer. What he (Lieutenant Weyprecht) and his friend Count Wilczek had done was to bring the subject into the precise form it had now attained. They had proposed, for example, the establishment of Polar observatories in the following places, there or thereabout:—Finmark, Spitzbergen, Novaya Zemlya, East and West Greenland, the North American Archipelago, Point Barrow, and the mouth of the Lena. In the Antarctic seas also two positions were required. It would take him too long to enter fully into the objects which these observatories would aim at carrying out, but he would state them briefly as being answers to the following questions:—1. Are the differences in the daily periods of magnetic disturbances known to us special to the localities, or are they annual phenomena? 2. How are the disturbance-intensities in different places related to each other? 3. Does the disturbance-intensity stand in a determinate relation to one of the fundamental magnetic elements? 4. In what relation do the disturbances on one side stand to those of the other in the different parts of the Polar region? 5. How does the total intensity in the disturbances behave? 6. How far do the disturbances extend? 7. Are there fixed centres of disturbance, or do they form themselves, and shift position like barometric depressions? 8. In what connection do the disturbances stand with regard to the zone of greatest intensity and frequency of the aurora borealis? 9. In what connection do they stand with regard to the single aurora? and 10, with the different forms of the aurora? 11. What connection is there between the magnetic phenomena of the Arctic and Antarctic regions? and 12, between them and electric earth currents.—Professor BUYS-BALLOT said that a full third of the earth's surface yet remained to be explored in a magnetic and meteorological sense, and that no useful results could be obtained unless stations for observation were established not further than 10°, 15° or, at most, 20° from each other.

NEW BOOKS.

(By E. C. RYE, *Librarian* R.G.S.)

EUROPE.

Baedeker, R.—Norway and Sweden. Handbook for Travellers. Leipsic (Baedeker) & London (Dulau): 1879, 12mo., pp. 409, maps and plans.

An extension of this practical series to Scandinavia, on the same principle as the other volumes. A sketch of Norwegian and Swedish grammar with vocabulary and list of phrases (pp. 42) is added, and can be detached if wished.

Crenneville, Victor Graf Folliot de.—Die Insel Cypern in ihrer heutiger Gestalt, ihren ethnographischen und wirtschaftlichen Verhältnissen. Wien (Faesy & Trick): 1879, 8vo., pp. 49. (*Williams & Norgate.*)

The author is Austrian Vice-Consul at Smyrna and visited Cyprus in the spring of 1876, paying chief attention to ethnographical subjects.

Utješonović O.—Die Naturschätze im nördlichen Croatien. Wien (Braumüller): 1879, 8vo., pp. 86, map. (*Williams & Norgate.*)

Specially describes the physical conditions of the North Croatian counties of Varasdin, Belovar and Kreutz, in which mineral substances of various valuable kinds exist. The map (scale 1:300,000) shows the whole of these and surrounding districts, with the various formations distinguished by colour, means of access, &c.

Vilovo, Johann Ritter Stefanović von.—Die Felsungen des Kasan und die Donau- und Theiss-regulirung. Wien, Pest, Leipzig (Hartleben): 1879, 8vo., pp. 103, maps, &c.

A valuable contribution to the science of fluvial engineering, in which the physical causes of the inundations of the Danube and Theiss are ably discussed. Two of the maps (scale 1:14,400) show the Kazan gates, which are divided into two portions of singularly similar physical conditions, the upper one named the Pojnikovo-Kazan, the lower the Mrakonia-Kazan, from two affluents on the left bank; the third map (scale 1:57,600) is of Budapest and its environs.

ASIA.

Arzruni, Krikor.—Die ökonomische Lage der Armenier in der Türkei. St. Petersburg (Academy of Sciences): 1879, 8vo., pp. 36.

A lecture delivered in Armenian by Dr. Arzruni at a meeting of the Tiflis Trades Union, and translated by A. Amiranjan, containing an account of the physical and political conditions of Armenia, especially referring to its productions and industries.

Eden, C. H.—Frozen Asia: a sketch of modern Siberia, together with an account of the native tribes inhabiting that region. London (Society for promoting Christian Knowledge): 1879, sm. 8vo., pp. 320, map.

Discusses the geographical, geological, zoological, botanical, historical, and ethnological conditions of Russia in Asia, with an account of modern explorations.

Santarem, Visconde de.—Memoria sobre o Estabelecimento de Macau. Lisboa (Imprensa Nacional): 1879, 8vo., pp. 108.

This account of the early establishment of the Portuguese in China, by the late Viscount de Santarem (published by J. F. J. Biker), is supplemented by a short relation of the Embassy sent in 1725 by S.M. João V. to Yum Chim, Emperor of China, written by A. M. de Sousa Menezes the Ambassador; and by the report to S.M. José I. by F. de Assis Pacheco de Sampaio, of the Embassy to Peking in 1752.

AFRICA.

Beltrame, G.—Il Sennaar e lo Sciangallah. Memorie del Prof. Cav. Ab. G. Beltrame, già Missionario nell' Africa Centrale. Verona & Padova (Drucker & Tedeschi): 1879, 2 vols., sm. 8vo., pp. 305 & 313, portrait, map. (*Dulau.*)

The author has twice visited the Eastern Sudan, with the object of exploring the basins of the White and Blue Niles, prior to the establishment of an Italian Mission. On the first occasion, in 1853, he followed the latter river up to 10° 30' N. lat., paying special attention to the geography of the region traversed and the habits of its people. In 1859, his experiences were chiefly on the right bank of the Bahr-el-Abiad, including its Sobat affluent; he paid much attention to dialects, having written and published a grammar and dictionary of the Denka language.

The map (scale 1 : 3,000,000) is of the Nile region between Khartum and the Sobat River.

Deléage, Paul.—Trois mois chez les Zoulous, et les derniers jours du Prince Impérial. Paris (Dentu): 1879, 12mo., pp. 370, pls. (*Dulau.*)

Contains a few good drawings of natives, &c., from photographs.

Holub, Emil.—The Victoria Falls. Grahamstown (Sheffield): 1879, 12mo., pp. 16.

This extract from the Diary of Dr. Holub during his third trip into the interior, contains accounts of the Falls in their present condition, of the Zambesi below them, and of the surrounding country and its inhabitants.

Largeau, V.—Le Pays de Rirha, Ouargla, Voyage à Rhadamès. Paris (Hachette): 1879, pp. 413, map, pls. (*Dulau.*)

The author's project was to reach the Niger from Algeria by following the great valleys of the Sahara, but he appears only to have penetrated as far south as Zmalla, about 31° N. lat., after staying at Wargla. The map (scale 1 : 2,500,000) covers the whole of the north-central Sahara, but a very small portion being occupied by M. Largeau's route. Many particulars of desert life are given in the text, with notes on ethnology, &c.

Soyaux, Herman.—Aus West-Afrika. 1873-1876. Erlebnisse und Beobachtungen. Leipzig (Brockhaus): 1879, 2 vols., 8vo., pp. 350 & 229, map. (*Dulau.*)

The author started for the west coast at the end of 1873, and visited the German station Chinchosho, from which he went up the Loango coast to Kuilu, making an excursion up the river to the Majombe country. Going south by sea, and touching at various points, he arrived at St. Paul de Loanda, from which place he followed the Coanza to Dondo, making further inland journeys among the mountains as far as Mpungu-an-dongo. His attention was chiefly directed to the productive capabilities of Angola and other regions visited; and a copious index shows that his range of observations was extensive (including natural history).

The map is from Sierra Leone to the mouth of the Coanza (scale 1 : 6,000,000), with an inset of Loango and Angola on the larger scale of 1 : 3,000,000.

Von der Decken.—Baron Carl Claus von der Decken's Reisen in Ost-Afrika in den Jahren 1859-1865. Dritter Band: wissenschaftliche Ergebnisse. Dritte Abtheilung. Leipzig & Heidelberg (Winter): 1879, 4to., map, pls., tables. (*Ascher.*)

This long-delayed portion of the scientific section of Von der Decken's Travels, published under the charge of his mother, the Fürstin Adelheid von Pless, completes the work, of which the first part was published just ten years ago. Dr. Otto Kersten supplies a prefatory chapter, followed by an abstract of the scientific results of the travels of Von der Decken and his companions; a table of contents of the whole work, and a list with localities of the new genera and species of plants and animals described in vol. iii.

The body of the present part consists of (1) Geology, by Alexander Sadebeck,

pp. 40, with map of the East Coast from Massowa to the mouth of the Zambesi, including the great lakes (scale 1 : 7,500,000), coloured to represent formations so far as known; (2) Botany, by P. Ascherson, O. Böckeler, F. W. Klatt, M. Kuhn, P. G. Lorentz, and W. Sonder, pp. 91, 5 pls.; (3) Meteorology of Zanzibar in monthly means, by Otto Kersten, pp. 36, many tables; (4) Astronomical, Geodetical, and Elevation measurements in Central East Africa, with cartographical observations, by Kersten, pp. 107; (5) Magnetic observations in Central East Africa, by Kersten, with supplement by C. Börgen on Dr. A. Roscher's in 1858 and 1859, pp. 48; (6) A tabular Summary of the history of East Africa, founded on Guillaum, by Kersten, pp. 40; (7) An account of the Literature of East Africa and the East African islands, geographical notes from the papers of Roscher, Von der Decken and Kinzelbach, and nautical observations on the coast of Great Comoro by Captain Bigrel, pp. 48.

AMERICA.

Mathews, E. D.—Up the Amazon and Madeira Rivers, through Bolivia and Peru. London (Sampson Low & Co.): 1879, 8vo., pp. 402, pls., map.

Mr. Mathews was engineer of the projected Madeira and Mamoré railway, and on the temporary stoppage of that undertaking returned to Europe from San Antonio on the Madeira. He followed the western affluent, the Mamoré, and its tributary the Chapari to Cochabamba, Chuquisaca, Potosí, and Oruro; crossed the great Bolivian plateau, entered Peru at Aucamarca, descended the Andes, and arrived at Arica on the coast, via Tacna, returning by Panamá. The work contains many observations on the physical conditions of the great South American rivers, and the flora and fauna of the region traversed; also on the natives, of whom the Sirionos on the Brazilian side of the Madeira appear to be still hostile. Indian carvings on the rocks of the rapids are described and figured. Tables of approximate heights of localities after San Antonio, with their vegetable productions; of Bolivian exports from Arica; of temperatures, rainfall, and depth of flood-water below the San Antonio falls, conclude the work. The map, by W. & A. K. Johnston, covers the South American continent from the mouth of the Amazon to Minas Geraes.

Perú y Chile, Varias Relaciones del, y Conquista de la Isla de Santa Catalina, 1535 á 1658. Madrid (Ginesta): 1879, 12mo., pp. 359. (*Quaritch*.)

This forms vol. xiii. of the 'Coleccion de Libros Españoles raros ó curiosos,' and contains 5 accounts of matters connected with the early history of South America, some not before printed, and others of very rare occurrence in libraries.

AUSTRALASIA.

Heaton, J. H.—Australian Dictionary of Dates and Men of the Time: containing the History of Australia from 1542 to date. Printed by authority of the Government of New South Wales. London (S. W. Silver): 1879, 8vo., pp. 234 and 320.

The second part contains a complete chronological account of Australian Land Explorations and Navigations (pp. 16–36). Explorations in the separate colonies are also recorded in some cases.

Smyth, R. Brough.—The Aborigines of Victoria: with notes relating to the habits of the natives of other parts of Australia and Tasmania. Compiled from various sources for the Government of Victoria. Melbourne (Ferres) & London (Trubner): 1878, 2 vols., large 8vo., pp. 483 & 456, pls., maps.

No better general idea of the scope of this work can be here given than by terming it not only the most complete one that has appeared on its special subject, but probably the most authentic and exhaustive treatise on the ethnology of any one country. The title affords no indication of the mass of information bearing upon a correct understanding of the Australian continent contained in the book, which will be found as interesting to the general reader as it is valuable to the student.

Stone, O. C.—A few months in New Guinea. London (Sampson Low & Co.): (1879), 8vo., pp. 258, pls., maps.

The author describes his voyage up the Maikasa or Baxter River, of which he gives a map (scale $\frac{1}{2}$ inch to a mile), excursions up the Laroki, visits to Roro and Baruni, &c.; his work is especially valuable for the numerous details contained in it of the habits, &c., of the natives, with whom he had considerable intercourse. An appendix contains a Motu vocabulary, a comparison of words in various New Guinea and Torres Strait island dialects, list of birds, camp equipments, &c.

ARCTIC.

Bessels, E.—Die Amerikanische Nordpol-Expedition. Leipzig (Engelmann): 1879, sm. 4to., pp. 647, map, tables, pls.

Although somewhat tardily issued, this volume will be welcomed by Arctic students, as giving Dr. Bessels's own account of the episodes of the voyage of the *Polaris*, during which Captain Hall died; and it will be of special interest to the author's fellow-countrymen, to whom the voluminous narrative published by the United States Government is probably inaccessible. The map, scale 1:2,970,000, includes Sir George Nares's discoveries, and gives in an inset the track of the party on the drifting ice-floe, &c.

Howgate, H. W.—The Cruise of The Florence; or, Extracts from the journal of the preliminary Arctic Expedition of 1877-78. Edited by H. W. Howgate, U.S.A. Washington (Chapman): 1879, 12mo., pp. 183.

Extracts from the official journals of Captain G. E. Tyson, who started from New London in the beginning of August 1877, wintered in Cumberland Bay, and after visiting Disco, reached Newfoundland at the end of September 1878. The object of the expedition was to collect supplies that might be useful for the main enterprise of establishing a colony on the shores of Lady Franklin Bay, for which Congress subsequently refused the necessary grant; but scientific investigations were also made. Some particulars of Lake Kennedy (p. 95), which is reported to abound in reindeer, birds, and fish, deserve notice. The scientific material is fully described and discussed in No. 15, Bulletin of the United States National Museum, under the head "Contributions to the Natural History of Arctic America made in connection with the Howgate Polar Expedition, 1877-78," by Ludwig Kumlien, naturalist of the Expedition, assisted by various American zoologists and botanists.

Nordenskiöld, Adolf Erik, The Arctic Voyages of, 1858-1879. London (Macmillan): 1879, 8vo., pp. 447, pls., maps.

Mr. Alexander Leslie of Aberdeen has anticipated popular demands by preparing, with Professor Nordenskiöld's permission, an account of the Arctic voyages of that distinguished traveller before the North-East passage was planned, to which he has added a sketch of the history of the recent successful voyage of the *Vega* so far as known. After an autobiographical sketch, the book describes the Swedish Arctic Expeditions of 1858, 1861, and 1864, the polar Expedition of 1868, the Expedition to Greenland of 1870, the second polar Expedition of 1872-3, the voyage to the Yenissei and ascent of that river in 1875, the second voyage to the Yenissei in 1876, and finally the North-East Passage Expedition. A first appendix contains Dr. Envall's Official Report to the Swedish Royal Board of Health on the Hygiene and care of the sick during the second polar Expedition; and in a second appendix is given a list of books and memoirs relating to the Swedish expeditions, classified by subjects. There are 43 illustrations of scenery, natural history and botanical subjects, &c. The maps are (1) circumpolar, (2) Spitzbergen, (3) illustrative of the Yenissei voyages, (4) of the Taimyr peninsula.

GENERAL.

Gaffarel, Paul.—Les Colonies françaises. Paris (Germer Baillière & Co.): 1879, 8vo., pp. 423. (*Williams & Norgate.*)

An account of the historical, physical, economical, and political geography of all the French Colonies, with bibliography in each division arranged according to date.

Hoskiær, V.—Et Besøg i Grækenland, Ægypten og Tyrkiet. Kjöbenhavn (Prior): 1879, 8vo., pp. 198, 5 maps. (*Williams & Norgate.*)

This account of the author's experiences in Greece, Egypt, and Turkey is only noticeable for the good execution of the coloured maps, which are of Athens and its neighbourhood (scale 1 : 150,000), Egypt (1 : 20,000,000), Cairo and neighbourhood (1 : 250,000), Constantinople and the Bosphorus.

Pfeil, L. Graf von.—Kometische Strömungen auf der Erdoberfläche. Berlin (Hempel): 1879, 8vo., pp. 193, coloured maps. (*Williams & Norgate.*)

Contains accounts of the distribution of meteorites upon the earth's surface, with theories on their antiquity and the currents in which they have fallen, &c. The maps illustrate Europe during the older and recent glacial periods, showing the places in which meteoric substances have fallen, also the world at the latter epoch, and ideal comet currents.

Schiltberger, J.—The Bondage and Travels of Johann Schiltberger, a native of Bavaria, in Europe, Asia, and Africa, 1396–1427. Translated from the Heidelberg MS. edited in 1859 by Professor Karl Friedrich Neumann, by Commander J. Buchan Telfer, R.N., F.S.A., F.R.G.S. With Notes by Professor P. Bruun, of the Imperial University of South Russia, at Odessa; and a Preface, Introduction, and Notes by the Translator and Editor. London (printed for the Hakluyt Society): 1879, 8vo., pp. 263, map.

Forms No. LVIII. of the publications of the Society above named, and is marked by the precision and extreme attention to accuracy in detail which characterise the Editor's former work. Schiltberger was made prisoner at the battle of Nicopolis, and was taken into the service of Bajazet, sharing in expeditions to Egypt and Asia Minor. Falling into the power of Timour, he took part in the invasions of Armenia and Georgia, the expedition to Abhase, and the return to Samarcand across the Araxes and through Persia. He remained in the service of Timour's son and grandson at Kars and Erivan, from which latter place he traversed the western provinces of the Caspian, passing through Derbent into Great Tatary, afterwards visiting Siberia, and eventually crossing the kingdom of Kiptchak and arriving at Kaffa in the Crimea. He then went again to Egypt, and to Palestine and (probably) Arabia, returning to the Crimea, whence he journeyed to the Caucasus and back to Mingrelia. Escaping to the shores of the Black Sea, he reached Lazistan, was taken by ship to Constantinople, and finally found his way to Bavaria. A clearly executed map shows these wanderings, and gives the names as originally spelled. It is unnecessary to do more than refer to the interest of a record of these extended travels at such an early date.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

WORLD.

Kimber, T., M.A.—Chart showing the comparative time of the World. Designed by T. Kimber, M.A. Published by W. & A. K. Johnston, Edinburgh and London, 1879. (*Johnston.*)

Petermann's 'Geographische Mittheilungen.'—Die Temperatur-zonen der Erde. Von Alex. Supan. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 18. Gotha: Justus Perthes. (*Dulau.*)

Stanford, E.—Library Map of the World. In 4 sheets, size 5 feet 7 inches by 2 feet 10 inches. Mercator's projection. 1879. (*Stanford.*)

This map has been brought up to date, is coloured politically, and shows all the chief Ports in the world; the principal Ocean Currents, their direction,

and rate; the Trade Winds and Monsoons; the principal Ocean Mail Routes with average passage in days noted; the Submarine Telegraph Cables, and a scale showing the progress of the sun's vertical action between the Tropics. The curves of equal magnetic variation are shown on inset maps.

EUROPE.

Arendts, C.—Specialkarte der Königreich Bayern in seiner neuen Gerichts- und Verwaltungs-Eintheilung von 1 Octbr. 1879. Scale 1 : 400,000 or 5·5 geographical miles to an inch. C. Arendts, Stuttgart. 4 sheets, coloured. (*Dulau.*)

Austrian Government.—Specialkarte der k. u. k. österreichisch-ungarischen Monarchie. Scale 1 : 75,000 or 1 geographical mile to an inch. 1879. (*Dulau.*)

The following sheets have just been published:—Zone 6, columns XVI., XIX.; Zone 8, columns XXI., XXIII., XXIV.; Zone 9, columns XXIII., XXV.; Zone 10, column XXIV.; Zone 12, column XXVI.; Zone 15, columns XII., XIII.; and Zone 13, column XII.

Bartholomew, J.—H. W. Smith & Son's Plan of Brighton. Scale 300 yards to an inch.

Plan of Eastbourne. Scale 300 yards to an inch.

Plan of Hastings and St. Leonards. Scale 325 yards to an inch.

Map of the Isle of Wight. Scale 1 : 64,000 or 1·1 inch to a geographical mile.

J. Bartholomew, Edinburgh. H. W. Smith & Son, London, 1879.

These are reductions from the Ordnance Survey, and form part of a series of reductions which are intended for the use of tourists.

— Scottish Election Guide and Political Map of Scotland. Scale 1 : 1,650,000 or 22·5 geographical miles to an inch. John Bartholomew, Edinburgh, 1879.

This map, which is printed in colours, contains particulars of all the Parliamentary Elections which have taken place in Scotland during the present reign; of the Scottish Burgh and County Franchises, and many other subjects of interest and importance to Electors and Candidates.

Danish General Staff.—Topographical Atlas of Jutland, published by the Danish General Staff. Scale 1 : 40,000, or 1·8 inch to a geographical mile. Sheets: Koilemorten, Nim, & Ulborg, Copenhagen, 1879. (*Dulau.*)

Dépôt de la Guerre.—Nouvelle Carte de France, exécutée par ordre du Gouvernement. Scale 1 : 80,000 or 1 geographical mile to an inch. Rapport sur cuivre. Dépôt de la Guerre, Paris. (*Dulau.*)

Livraison 38 contains sheet 225, Nice, and when the remaining sheets of Corsica (which are now in progress) are added, this fine map of France, by "l'Etat-Major," on the scale of 1 : 80,000 or 1 geographical mile to an inch, will be complete. The whole map comprises 273 sheets, including Corsica. An edition of this map is published, entitled 'Rapport sur pierre,' which is much cheaper than the copper-plate edition, though the same map. Some reductions of this map have been published, such as the 'Carte de France' 1 : 320,000, on 32 sheets, 'Carte de la Frontière des Alpes' 1 : 320,000, 'Cartes des Chemins de fer Français' on the scales of 1 : 1,600,000, and 1 : 800,000, and many others.

— Environs de le Mans, in 9 sheets. Scale 1 : 20,000. Environs d'Alençon, 9 sheets. Scale 1 : 20,000. Environs de Rennes. Scale 1 : 20,000. Dépôt de la Guerre, Paris, 1879. (*Dulau.*)

Of this series, "Environs de garnison au 1 : 20,000 (or 3·6 inches to a geographical mile), Photolithographie en couleurs," Amiens, Belfort, and Rouen have each been published in 9 sheets.

Dépôt de la Guerre Belgique.—Carte Géologique de la Belgique, réduction de la Carte Géologique d'André Dumont. Indiquant les terrains qui se trouvent au

dessous du limon hesbayen et du sable campinien ; par les Lieutenants Lelorrain et E. Henry, du Dépôt de la Guerre Belgique. Scale 1; 380,000 or 5·2 geographical miles to an inch. (*Bartholomew, Edinburgh.*)

This map, which is engraved by J. Bartholomew, of Edinburgh, is geologically coloured, and obtained a special medal at the Linnean Exhibition, 23rd Sept., 1877.

Jordan, James B.—Geological Section showing the order of superposition, and approximate maximum thickness of sedimentary strata in the British Islands. Scale 3000 feet to 1 inch. Edward Stanford, 1879.

This section was originally prepared as an Index of Colours to Stanford's Geological Map of the British Islands, edited by Professor A. C. Ramsay, by whom it has been revised and corrected.

Kiepert, H.—Spezial-Karte des deutschen Reichlandes Elsass-Lothringen. Im Auftrage des kaisrl. Ober-Prasidiums zu Strassburg nach amtlichen Quellen bearbeitet. 1: 250,000 or 3·4 geographical miles to an inch. 4 sheets, chromolith. D. Reimer, Berlin. (*Dulau.*)

Moser, G.—Cartes des Chemins de Fer Français, par G. Moser. Scale 1: 1,581,000 or 21·5 geographical miles to an inch. Dupont et Cie., Paris, 1879. (*Dulau.*)

In this map the different railway companies are distinguished by different colours; the lines of coasting steamers are laid down, and on six inset maps are given the environs of Paris, Lille, Bordeaux, Marseille, Lyon, and the Chemin de Fer de Ceinture de Paris.

Ponsin, A.—Carte Cantonale de la Forêt et la Vallée de Montmorency et des environs, par A. Ponsin, Ing^r. Géomètre et Architecte. 1879. Scale 1: 20,000 or 3·6 inches to a geographical mile. Regnier, Paris. (*Dulau.*)

Prussian General Staff.—Sectionskarten: 1: 100,000 or 1·3 geographical mile to an inch. Sect. 40: Carthaus, 98: Neustettin, 101: Tüchel, 118: Deutsch-Krone, 142: Bromberg, 162: Argenu, 287H: Fulda. Kpfrst. u. color. à M. 1.—
— Kreiskarten, 1: 100,000 or 1·3 geographical mile to an inch. Kreis Strassburg, Marienburg, Rosenberg, Neidenburg, Osterode. Kpfrst. und color. à M. 2.—
Messstischblätter, 1: 25,000, or 2·9 inches to a geographical mile. Ost-Gruppe Nr. 1: Gr.-Lübbe, 3: Gr.-Linichen, 4: Büßen, 7: Gr.-Spiegel, 8: Märk.-Friedland, 13: Callies, 14: Spechtdorf, 15: Marzdorf, 16: Deutsch-Krone, 19: Wtclno, 20: Zolondowo, 21: Zatten, 22: Tütz, 23: Ruschendorf, 24: Arnsfelde, 25: Gr.-Wittenberg, 26: Schneidemühl, 27: Schmilau, 28: Wissek, 29: Wirsitz, 30: Sadke, 31: Nakel i/ Posen, 35: Fondon, 36: Wender, 37: Schloppe, 38: Kl.-Dresen, 39: Schönlanke, 40: Radolin, 41: Usch, 42: Morzewo, 43: Samotsehin, 44: Jaetorowo, 45: Gromaden, 46: Szaradowo, 51: Pensau, 54: Schirpitz, 57: Gniewkoro, 58: Schönau.—Tabl. C. Nr. 7: Süderwilstrup, 8: Halk-Hoved, 12: Trarup, 25: Sterup, 23: Gelting, 27: Öhe, 38: Westermakelsdorf, 39: Krummensiek, 46: Burgauf Fehmarn, 55: Bendfeld, 56: Giekau, 62: Preetz, 63: Selent, 64: Lütjenburg, 65: Hansühn, 66: Oldenburg i/H, 68: Fischer-Buden, 69: Müritz, 72: Stolpe, 73: Plön, 74: Eutin, 75: Neustadt i/H, 88: Süsel, 89: Rettin, 99: Curau, 110: Schönberg i/M. Lith. u. color. à M. 1. Berlin, Schropp, 1878-79. (*Dulau.*)

Roussel, E.—Plan de la Ville de Nancy, réduit du Plan d'Alegnement, revu, complété et mis à jour par E. Roussel, 1879. Scale, 1: 5000 or 14·5 inches to a geographical mile. Erhard, Paris. (*Dulau.*)

Società Inglese per opere pubbliche in Italia.—Carta Generale delle Strade Ferate d'Italia, presenti e future, 1879. Scale: 1: 1,500,000, or 20·4 geographical miles to an inch. E. Müller, Rome. (*Dulau.*)

This map is based, by special authorisation of the Italian Minister of War,

on the Ordnance Map of the Italian Army, and contains a table indicating the new lines of Railway voted by the Italian Parliament, arranged in three categories, each being distinguished by its colour; it also shows double and single lines, as well as all tramways, projected lines of railway, and the routes of steam navigation.

Stanford, E.—Tourist's Map and Visitors' Guide to the Isle of Wight. Scale 1 : 64,000, or 1·1 inch to a geographical mile; containing an inset map showing the Island, Southampton Water, and the adjacent country, on a reduced scale. Folded in case with 31 pages of letterpress. E. Stanford, London, 1879. (*Stanford.*)

Steinhauser, A.—Das Sandschak Novi Bazar nebst Nord-Albanien, Neu-Serbien und Montenegro, sowie Theilen von Bosnien und der Herzegovina. Scale 1 : 864,000 or 11·8 geographical miles to an inch. Vollständig neu bearbeitet von A. Steinhauser. Artaria & Co., Vienna, 1879. (*Steinford.*)

Welche and Mahon.—Atlas cantonal de Lot-et-Garonne, dressé par Sevin Talive, corrigée par Welche, Mahon, Champagnac, etc., Paris. Scale 1 : 30,000 or 2·4 inches to a geographical mile. Canton de Houeilles 1879, Canton de Villeréal 1879, Canton de Fumel 1879. (*Dulaud.*)

The publication of the "Atlas Cantonal" has been in progress since 1873, and in addition to the sheets just produced, the maps of thirty Cantons have already been published.

ORDNANCE SURVEY MAPS.

1-inch—General Maps:—

ENGLAND, New Series: Nos. 287, 304, 320, in outline and with contours.

SCOTLAND: Sheets Nos. 85, 86, with hills.

6-inch—County Maps:—

ENGLAND AND WALES:—Denbigh: 20, 21 (on 16, 17 Flint), 40 (on 24 Flint), 1, 25, 28, 29 (on 19, 20 Flint). Sussex, 15, 53, 79, 60, 67, 37, 3, 38, 80, 1 and 2 on single sheet.

SCOTLAND:—Argyllshire: (Rum Island), &c., 69, 60. Argyllshire and Inverness-shire: (Rum Island) and Ligg Islands, 70. Inverness-shire: Isle of Ligg, 71.

IRELAND:—Westmeath: 26, 27, 34, 35 (revised).

25-inch—Parish Maps.

ENGLAND AND WALES:—Berks; Coleshill, 2 sheets; Great Coxwell, 2 sheets; Great Faringdon, 3 sheets; Shrivenham (part of), 16 sheets. Bucks: East Claydon (part of), 5 sheets; Middle Claydon (part of), 5 sheets; Steeple Claydon (part of), 3 sheets; Winslow, 2 sheets. Glamorgan: Bishopston, 1 sheet; Cogan, 5 sheets; Ilston, 10 sheets. Herts: Braughing, 12 sheets; Caldicote, 4 sheets; Flamstead (part of), 11 sheets; Hinxworth, 5 sheets; Kelsall, 9 sheets; Radwell (part of), 4 sheets; Rayston, 4 sheets; Clothall (part of), 10 sheets. Notts: Kirkly in Ashfield (part of), 12 sheets; Sutton in Ashfield (part of), 13 sheets. Oxford: Checkendon, 3 additional sheets; Mapledurham, 8 sheets; Ipsden, 2 sheets; Mongewell, 4 sheets; Nettlebed, 2 sheets; Newnham Murren, 2 sheets; Nutfield, 2 sheets. Wilts: Higworth, 5 additional sheets.

SCOTLAND: Inverness-shire; Inverness and Bona, XI. 13 (formerly XI. 14).

Town Plans:—

ENGLAND AND WALES:—Notts: Sutton in Ashfield, 10 feet, 8 sheets; Staffordshire: Hanley (part of), 10 feet, 13 sheets; Stoke-on-Trent (part of), 10 feet, 72 sheets; Longton, 10 feet, 38 sheets.

SCOTLAND:—Edinburgh, Nos. 24 and 39, 5 feet (revised).

IRELAND:—Tralee, 1-29 inclusive, 10 feet.

Index Maps:—

Scotch Index Maps, 3 miles to 1 inch.

Aberdeen and Banff, Sutherland.

6-inch:—**GEOLOGICAL SURVEY MAPS.**

YORKSHIRE; Nos. 200, 116. (*Stanford, agent.*)

ASIA.

Petermann's 'Geographische Mittheilungen.'—Originalkarte der neuesten Schiffskurse durch das Karische Meer in die Mündungsbuchten der Nordsihirischen Flüsse Oh und Jenissei, 1877–78. Scale 1 : 5,000,000, or 66·6 geographical miles to an inch.

Captain C. Dahl's Aufnahme des Unteren Ob-stromes in August 1877. Scale 1 : 450,000, or 19·8 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 15. Gotha : Justus Perthes. (*Duluu.*)

Indian Government Surveys:—Great Trigonometrical Survey of India. Preliminary Chart of Secondary Triangulation, executed by the Burmese Party. Season, 1877–78. Thayetmo via Prome, Myanounng, and Bassein, towards Cape Negrais; also Pegu, Rangoon, and Coast.—Indian Atlas. Quarter sheets. Sheet 33, N.E. Parts of Jeypore and Jodhpore, in Rajputana. Sheet 35, N.E. Parts of Gwalior, Udepur [Oodeypore], Jaura [Jaora], Tonk, and Jhallawar. Also Neemuch Cantonment.—Lower Provinces Revenue Survey. District Dinajpoor [Dinagore]. Scale 1 mile to 1 inch. On 13 sheets. Sheet No. 4.—Lower Provinces, Bengal. District Purneah. 1840 to 1847. Scale 4 miles to 1 inch. Reprinted from the Indian Atlas, with additions, in 1879.—Eastern Bengal, Assam, Burma, and parts of China and Siam, corrected to 1875, 2nd edition.—North-West Provinces Survey. District Agra. With Village Boundaries and Heights. Surveyed in 1872 to 1875. Published in 1879. Scale 1 mile to 1 inch. On 10 sheets. Sheets 2, 5, 6, 8, 9.—Trigonometrical Branch, Survey of India. Jaunsar Bawar, District Dehra Dun. Scale 2 inches to 1 mile. On 4 sheets. Sheets 1 and 4.—Ganjam and Orissa Topographical Survey. Scale 2 miles to 1 inch. Seasons 1854 to 1856 and 1862 to 1863. Parts of District Sambalpur in the Central Provinces, and of the Garhjat States of Patna, Sonpur, Phuljhar, and Borasamar attached thereto. Sheets Nos. 66 and 67, Old Series. On 1 sheet.—The Province of Assam under the Jurisdiction of the Chief Commissioner. 1875. Scale 24 miles to 1 inch.—Deccan Topographical Survey. The Fortress of Rajghar, in the Bhore [Bhor] State. 1879. Scale 6 inches to 1 mile.—Deccan Topographical Survey. The fortress of Torna or Prichatgarh, in the Bhore [Bhor] State. 1879. Scale 6 inches to 1 mile.—Trigonometrical Branch Survey of India. Guzerat. Scale 1 inch to 1 mile. Sheets 14, 15, 28. Guzerat. Scale 4 inches to 1 mile. Section 3 of sheet 49. Dang Forests. Section 4 of sheet 49. Dang Forests. Kattywar. Scale 1 inch to 1 mile. Sheets Nos. 55 and 81. On 1 sheet. Parts of Sorath, Hallar, and Barda. (*Stanford, agent.*)

NOTE.—The names in brackets [] are authorised spellings.

Johnston, W. & A. K.—New War Map of Afghanistan. Scale 1 : 3,500,000 or 47·6 geographical miles to an inch. With a Sketch Map of the country between Peshawar, Thal, and Kabul, showing the chief Passes. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. W. & A. K. Johnston, Edinburgh and London, 1879. (*Johnston.*)

On this map are also given two inset maps, one of the World, showing the British possessions and dependencies, and another showing a part of Asia.

Walker, Major-General J. T., C.B., R.E., F.R.S., &c.—Map of Turkestan and the Countries between the British and the Russian Dominions in Asia; on 4 sheets. Scale 1 : 2,027,520, or 27·8 geographical miles to an inch. Fourth

edition. Compiled under the orders of Major-General J. T. Walker, C.B., R.E., F.R.S., &c., Surveyor-General of India, and Superintendent Great Trigonometrical Survey. Photozincographed at the Office of the Trigonometrical Branch, Survey of India, Dehra Dun, 1879.

This edition of General Walker's map of Turkestan, and the Countries between the British and Russian Dominions in Asia, has been extended by one degree of latitude, both to the north and south, beyond the limits of the previous edition, in order to include the stations of Sukkur and Jacobabad, the extension to the north having been made to preserve the symmetry of the map. Sheets 1, 2, and 3 have been entirely redrawn; sheet 4 (though not redrawn) has been corrected up to date. Sheets 1 and 2 contain extensive additions on the borders of the Caspian and Aral Seas, in Khiva and Bokhara, the Turkoman Desert, along the course of the River Oxus, and, more particularly, in Khokand and Hissar, the Alai Plateau, the Northern Pamir, and the Independent States of Karatigin and Darwaz. These corrections and additions have been, for the most part, derived from the Russian Map of the Turkestan Military Circle (in 12 sheets), and from Russian maps published in the 'Geographical Magazine.' In rendering the portions of Karatigin, and Darwaz adjacent to the bend in the Panjah branch of the River Oxus, the explorations of the Havildar have been closely followed. Sheet 3 contains additions, and corrections, taken from Major St. John's Map of Persia, Major Wilson's Map of Afghanistan, Colonel Macgregor's Reconnaissance across the Desert of Beluchistan, and Major Napier's sketch of the Northern Frontier of Khorassan. The recent surveys of officers attached to General Stewart's Division have been used to some extent for the purpose of adding to, and correcting the routes between Khelat, Quetta, and Candahar. Sheet 4 contains much new Geography, obtained from the survey officers accompanying General Biddulph's column from Candahar to Dera-Ghazi-Khan by the Thal-Chotiali route, and that of General Roberts in the valleys of Kurram, Khost, and Ali-Kheyli, while extensive additions have been made in the country north of the Safed-Koh range for some distance beyond the Kabul River. Considerable alterations have been made in the region between the Kunar River and the Indus, and the position of Tirich-Mir, the highest peak yet discovered on the Hindu-Kush range, directly north of Chitral, has been laid down; this sheet is being redrawn with a view to the publication of a new edition (the fifth of this map).

AFRICA.

Wyld, J.—Wyld's South African series.

Map of South Africa. Scale 1:2,628,000, or 36 geographical miles to an inch. 1879.

Map of British South Africa, including Zululand, Natal, Transvaal, and Orange Free State. Scale 1:5,000,000, or 66·6 geographical miles to an inch. 1879.

Map of Eastern South Africa from the River Limpopo to Algoa Bay, embracing the Transvaal, Orange Free State, Natal, Zulu-, and Griqua-Land West, showing the British Settlements and Native Locations. Scale 1:1,742,000, or 24·3 geographical miles to an inch. 1879. J. Wyld, London. (*Wyld*.)

The maps composing this series have been brought up to date, and show very clearly the progress made in railway construction, as well as all post, and wagon roads, Native roads and tracks. In the "Map of South Africa," explanatory references are given as to the meaning of Dutch terms, the divisions, counties, and dates of occupation, or the cession of the different portions of the country. The "Map of British South Africa" contains an inset map of Zululand, on an enlarged scale, and two maps on a reduced scale, one showing the comparative area of the British Isles and British South Africa, while the other shows steam packet lines to the Cape of Good Hope, both by the Suez Canal and the Atlantic Ocean. These three maps make a very useful series, and are on a sufficiently large scale to be useful for ordinary general reference.

AMERICA.

Drayton-Gibbes, Charles, C.E.—Map of the States of California and Nevada carefully compiled from the latest authentic sources, by Charles Drayton-Gibbes, C.E. Scale 1:1,210,000 or 16·5 geographical miles to an inch. Warren Scott, San Francisco, 1878. (*Stanford.*)

This map is compiled from the United States Coast and Land Surveys, also from the State Geological Surveys by Professor J. D. Whitney, the Railroad Surveys, and the results of explorations made by Lieut-Colonel R. S. Williamson, U.S.A., Henry de Groot, C. D. Gibbes, and others. The Judicial Districts of California, and the counties comprised in them; the United States Land Districts, and the location of the offices; the chief mineral deposits of the States; military posts; railroads (built and proposed) are shown, and a section showing the elevation above the sea of some of the principal mountains in California and Nevada is given.

Petermann's 'Geographische Mittheilungen.'—Karte der Salzwüste Atacama, und des Grenzgebiets zwischen Chile, Bolivia und Peru. Scale 1:1,600,000, or 21·7 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879, Tafel 16. Gotha: Justus Perthes. (*Dulau.*)

AUSTRALIA.

Forrest, John.—Western Australia, Northern District, from De Grey River to Ashburton River, as surveyed by John Forrest, F.R.G.S., Deputy-Surveyor General, assisted by Surveyors Alexander Forrest, H. S. Carey, and R. M. King, 1878. Scale 1:770,000 or 10½ geographical miles to an inch.

POLYNESIA.

Verträge und Uebereinkünfte des Deutschen Reichs mit den Samoa-Inseln und anderen unabhängigen Inselgruppen der Südsee. L. Friederichsen und Comp., Hamburg. 1879. (*Stanford.*)

The text of the treaty is given both in the German and Samoan languages, together with all correspondence relating to the subject. Maps, with plans (based on the best German, English, and American authorities on South Sea commerce) are also given.

CHARTS.

Admiralty.—Charts published by the Hydrographic Department, in July and August 1879.

No.	Size.	Inches.	
2052	DE m =	1·5	England, east coast:—Harwich approaches (plan, Wood-bridge haven).
2248	$\frac{DE}{2}$ m =	various.	North America, west coast:—Anchorages in the Gulf of California—Pulpito, Mangles anchorages; Puerto Refugio; Amortajada, Santa Teresa, and San Francisquito, Salinas bays; San Lorenzo channel; Pichilingue harbour.
678	DE m =	0·1	North America:—Lakes Erie and Huron (plans, Rattlesnake, Collingwood, Penetanguishene, Goderich, Rondeau, harbours; port Huron).
476	$\frac{DE}{2}$ m =	1·0	Haiti or San Domingo:—Cayes, Flamand, St. Louis, and Meste bays.
2691	DE m =	0·1	Pacific ocean:—Fiji islands.
952	A m =	0·5	Japan, south coast of Nipon:—Owasi bay to Takamatsuno-saki, including Owari and Mikawa bays (plans, Nag Ura; Toba anchorage).
664	$\frac{DE}{2}$ m =	0·17	Africa, east coast:—Sheet 10, from 6° 38' S. to 4° 23' S., including the islands of Zanzibar and Pemba.
711	DE m =	0·5	Mauritius island.
1930	DE m =	0·75	North America, west coast:—Magdalena bay (plans, San Lucas, San José del Cabo bays and North channel).

No. 250. Plan of Odzutsu harbour added. No. 1689. Enlarged plan of Pontinha bay added. No. 1323. Plan of Ancon bay and adjacent islands added. No. 993. Plan of Sutt bay added.

CHARTS CANCELLED.

No.		Cancelled by	No.
2248	Anchorage in the gulf of California	New sheet. Anchorages in the gulf of California ..	2248
2293	Plan of San Lorenzo channel on this sheet	Plan of San Lorenzo channel on	2248
475	St. Louis and Meste bays. ..	New sheet. Cayes, Flamand, St. Louis, and Meste bays ..	476
476	Cayes bay	New chart. Fiji islands ..	2691
477	Flamand bay	New chart. Africa, east coast, sheet 10	664
2691	Fiji or Viti group	New chart. Mauritius island ..	711
664	Africa, east coast, sheet 10 ..	New chart. Magdalena, San Lucas, and San José del Cabo bays	1930
711	Mauritius island		
1913	San Lucas bay		
1930	Magdalena bay		

Marine Survey of India.—Charts Nos. 103*b*, Bay of Bengal, Eastern sheet. 1217, Approaches to Cutch Mandvi. Published at the Marine Survey Department, Calcutta, 1879, under the direction of Commander A. D. Taylor, I.N., Superintendent of Marine Surveys.

United States Bureau of Navigation.—Charts Nos. 862, West Coast of Africa, Cape Mount, the Sugruy and Malutah Rivers and Fisherman's Lake. 863, Eastern Shoals, Newfoundland Banks. 864, Atlantic Ocean, Caribbean Sea, Leeward Islands, Orehilla Island and Harbour. Published at the Hydrographic Office, Washington, D.C., 1879. Captain S. R. Franklin, U.S.N. Hydrographer to the Bureau of Navigation.

ATLASES.

Spruner, Dr. K. v.—Hand-Atlas für die Geschichte des Mittelalters und der neueren Zeit. Dritte Auflage. Neu bearbeitet von Dr. Theodor Menke. Part 21. Justus Perthes, Gotha, 1879. (*Dulau*.)

The contents of the 21st Part of Dr. K. v. Spruner's Hand-Atlas are as follows:—Vorbemerkungen, Seite 51. (No. 6.) Europa: No. VI. Europa um die Mitte des XIV. Jahrhunderts. Mst. 1:15,000,000. Von B. Hassenstein. (No. 23.) Italien: No. III. Italien 1137–1302. Mst. 1:3,700,000. Nebenkarten: 1) Mittel-Italien I. (Tuscia, Duc-Spoletanus, Marca Anconitana, etc.). Mst. 1:1,850,000. 2) Mittel-Italien II. (Apulia, Principatus Capuae, etc.). 3) Campania Maritima, Terra S. Benedicti. Mst. 1:1,925,000. Von Th. Menke. (No. 69.) Slawische Reiche: No. III. Polen, Lithauen und das Gebiet des Deutschen Ordens in den Jahren 1386–1480. Mst. 1:600,000. Nebenkarten: 1) Polen und Nachbarländer 963–992. Mst. 1:12,000,000. 2) Polen unter Boleslaw Chrobry und bis 1139. 3) Polen und Preussen 1140–1240. Mst. 1:6,000,000. 4) Polen und Preussen 1240–1386, desgl. 5) Preussen unter der Herrschaft des Deutschen Ordens. Mst. 1:3,000,000. 6) Die Kirchenprovinzen Gnesen und Riga im XIII. Jahrh. Mst. 1:24,000,000. 7) Die Kirchenprovinzen Gnesen, Riga und Lemberg im XV. Jahrh. Mst. 1:24,000,000. 8) Das Gebiet von Auschwitz und Zator. Mst. 1:2,000,000. 9) Das Zipser Gebiet. Mst. 1:2,000,000. Von Professor Dr. J. Caro. (No. 73.) Ungarn: No. I. Ungarn und seine Nebenländer vom Anfang des XIII. Jahrhunderts bis zur Schlacht bei Mohacs 1526. Mst. 1:3,700,000. Nebenkarten: 1) Pannonien zur Zeit des Svatopluk, 895. Mst. 1:15,000,000. 2) Ungarn bis zur Unterwerfung Croatiens um 1200. Mst. 1:7,400,000. 3) Ungarn im XII. Jahrhundert. Mst. 1:7,400,000. 4) Schlacht bei Mohi 1241. Mst. 1:185,000. 5) Schlacht bei Varna 1444. 6) Schlacht bei Mohacs 1526. 7) Plan von Buda-Pest. Mst. 1:150,000. Von Professor Dr. J. Caro.

Stieler, Adolf.—Hand-Atlas über alle Theile der Erde. Neu bearbeitet von Dr. August Petermann, Dr. Hermann Berghaus und Carl Vogel. Parts 5, 6, 7, and 8. Justus Perthes, Gotha, 1879. (*Dulau*.)

The following are the contents of Parts 5, 6, 7, and 8 of the new edition of Stieler's Hand-Atlas:—

Part 5:—No. 40. Spanische Halbinsel. Blatt 2. Nordöstlicher Theil. Von C. Vogel. 1:1,500,000. No. 50. Ost-Europa. Blatt 1. Norwegen,

Nord-Schweden und Finnland. Von A. Petermann. 1:3,700,000. Nebenkarten: Christiania und Umgegend, 1:150,000. Stockholm und Umgegend, 1:150,000. No. 68. Afrika. Von A. Petermann. 1:25,000,000.

Part 6:—No. 36. Frankreich. Blatt 3. (Südwest-Frankreich.) Von C. Vogel. 1:1,500,000. Nebenkarte: Paris und Umgegend, 1:150,000. No. 63. Indien und Inner-Asien. Südliches Blatt. Von A. Petermann. 1:7,500,000. Nebenkarten, Calcutta und Umgegend, 1:150,000. Die Insel Bombay, 1:150,000. Madras und Umgegend, 1:150,000. Point de Galle, 1:150,000. No. 82. West-Indien, Central America bis zum Südlichen Canada. Blatt 4. Von A. Petermann, 1:7,500,000. Nebenkarten: Jamaica, 1:2,000,000. Puerto Rico, 1:2,000,000. Guadeloupe und Dominica, 1:2,000,000. Martinique und Santa Lucia, 1:2,000,000. Habana und Umgegend, 1:1,000,000.

Part 7:—No. 25. Süd-West-Deutschland und die Schweiz. Südlicher Theil. Von C. Vogel. 1:925,000. No. 45. Die Britischen Inseln und das umliegende Meer. Von A. Petermann. 1:3,700,000. Nebenkarten: London und Umgegend, 1:1,150,000. Helgoland, 1:150,000, 1:50,000. No. 84. Vereinigte Staaten von Amerika in 6 Blättern. Blatt 2. Von A. Petermann. 1:3,700,000.

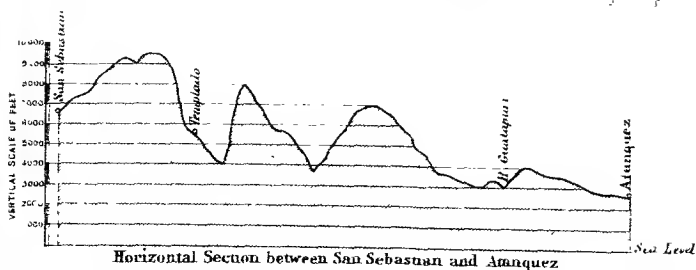
Part 8:—No. 22. Deutsches Reich in 4 Bl. Blatt 4. Von C. Vogel. 1:500,000. Nebenkarten: Berlin, Potsdam und weitere Umgegend, 1:150,000. Die deutschen Kriegshäfen Wilhelmshaven u. Kiel, 1:300,000. Das Saarbrücker Kohlenrevier, 1:500,000. Das Oberschlesische Berg- und Hüttenrevier, 1:500,000. No. 53. Ost-Europa in 6 Bl. Blatt 4. Inneres Russland. Von A. Petermann. 1:3,700,000. No. 57. Griechenland und der griechisch-türkische Archipel. Von A. Petermann, 1:1,850,000. Nebenkarten: Athen und Umgegend, 1:150,000. Santorin oder Thera, 1:500,000. Insel Syra, 1:500,000.

EDUCATIONAL.

Highman, Thos.—Geography and Atlas of the British Empire, its Dependencies and Colonies in Europe, Asia, Africa, and America, and Australia, with the scattered Islands in the Atlantic and Indian Oceans, 1879. (*John Heywood, Manchester.*)

This Atlas contains 37 maps, and has been prepared with great care; the letterpress consists of 137 pages (sm. 8vo.), and contains many useful statistical tables having reference to areas, population, and the physical geography of the British possessions in all parts of the world. It is specially adapted for the use of pupil teachers and children of the sixth standard of Elementary schools, as the language used contains only such words as are quite within the limits of their comprehension. It has been the intention of the author that this Atlas should be an assistance to the advanced pupils in Elementary schools in map drawing, and the maps are well adapted to that purpose, as they are not overcrowded with names, and the Physical features, such as rivers and mountains, are clearly marked. As this combined Atlas and Geography has been prepared from trustworthy sources, and as the statistics given have been, where possible, taken from Government returns, it may prove to be a useful work for general reference, though it is professedly only an elementary school Atlas.

Kiepert, H.—Politische Schul-Wandkarte von Asien. Scale 1:8,000,000 or 111.1 geographical miles to an inch. D. Reimer, Berlin. 9 sheets, chromolith. (*Dulau.*)

[illegible]

Mr Simons' routes
Alvaras in English Free above the Sea
The limits of the Archaean Terranes of Nevada
occupied by the Archaean Indians is shown in
a dotted line

PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

*Address on the Opening of the 49th Session of the Society,
November 10th, 1879.*

By the Right Hon. the EARL OF NORTHBROOK, President.

It has been during many years the custom for the President of the Royal Geographical Society at the first meeting after the summer recess, to make a few remarks on the occasion; the object being, I believe, to notice the more interesting geographical events that have occurred since the members last met, and also to announce the chief subjects which are proposed to be brought forward during the coming session.

One of the principal events which occurred during the last few months was the meeting of the British Association, at which Geography usually occupies a conspicuous position. The meeting was held this year at Sheffield, and the Geographical Section appears, from what I have gathered, to have maintained its usual high character, both with regard to the interest of the subjects which were discussed, and the numbers of those who attended its meetings. One of our Honorary Secretaries, Mr. Markham, very efficiently occupied the position of President of the Section, and after an interesting opening address on the principles of Geography as a science, read a most instructive and able paper on the basin of the Don, on the banks of which Sheffield is situated, thus illustrating geographical science in its broadest sense, by the description of a district within the knowledge of his hearers; showing the connection of geography with geology, and the power of man to alter the face of nature, as manifested especially at Hatfield Chase in the Don Valley. No wonder that this address was popular in Yorkshire, for Yorkshiremen, as we all know, are more thorough lovers of their county than the natives of any other part of Great Britain. The other papers read at the meeting were on a variety of interesting subjects, but most of them having appeared in abstract in the 'Proceedings' of the Society, it is not necessary for me to notice them further.

The most important geographical achievement during our recess has
No. XII.—DEC. 1879.]

been, without doubt, the completion of the North-Eastern Passage by the Swedish Arctic Expedition, under the direction of Professor Nordenskiöld. After a successful and rapid voyage along the Siberian coast in the summer of 1878, his exploring vessel, the *Vega*, was overtaken by winter near Behring Strait on the 25th of September of last year. She was released from the ice on the 18th of July last, and arrived at Yokohama on the 2nd of September.

On the news of this achievement reaching us, I hastened, in the name of the Society, to offer to Professor Nordenskiöld our hearty congratulations on his success, and to express our hope that he would be able to visit England, and give us an account of his voyage. I have heard from Mr. Oscar Dickson, of Gothenburg, the munificent promoter of this great undertaking (through whom I wrote to Professor Nordenskiöld), that he is not expected to return to Sweden before the end of March, but that he would no doubt avail himself of our invitation; and I have every confidence, therefore, that we may be able in the course of the spring to give a hearty welcome in this hall to this eminent and successful explorer.

Other interesting voyages have been made this summer in the Arctic seas. The cruise of Captain Albert Markham in the Norwegian cutter *Isbjorn*, of only 40 tons, and that of Captain De Bruyne in the little Dutch exploring vessel the *Willem Barents*, have yielded some new and interesting information about Novaya Zemlya, the Barents and Kara seas, and Franz-Josef Land.

I had hoped that Captain Markham would have been able himself to read to us the account which he has prepared of the results of his Expedition, and of the cruise of the *Willem Barents*, but having been appointed Flag-Captain to the *Triumph*, in the Pacific, he was obliged to leave England in the beginning of this month. His paper will, however, be read at our next meeting, on the 24th, when we hope to be favoured with the presence of Captain De Bruyne, and to hear something further regarding that remote Polar land which his vessel was so fortunate as to reach.

In the wide field of African discovery, the event which most nearly concerns ourselves, is the lamented death, on the 28th of June, of Mr. Keith Johnston, the leader of the Expedition to explore the route from Dar-es-Salaam, south of Zanzibar, to Lake Nyassa, under the auspices of the Society. You will, I know, join with the Council in lamenting the premature death of this distinguished young geographer and explorer. He was eminently qualified by his training, by his previous travels, and by his apparently robust constitution for the task he had undertaken. The Expedition had made an excellent start, and penetrated about 100 miles into the interior, when Mr. Keith Johnston died. The command devolved upon Mr. Thomson, who was chosen as second to Mr. Johnston, on account of his qualifications as a geologist and natu-

ralist. We lately received, by the courtesy of Lord Salisbury, some interesting news of the progress of the Expedition, in a letter from Dr. Kirk to the Foreign Office, dated Zanzibar, September the 15th, which gives also some fresh information respecting the Lufigi River, this stream having been navigated as far as a place called Pangani, about 120 miles from its mouth in a direct line, by an Arab dispatched by the Sultan of Zanzibar. At Pangani there are rapids which prevented further progress, but it is thought that in the flood season they may be got over. The ascent to Pangani occupied twenty-four days, but the descent was accomplished in five. Pangani is reported to be not far from the junction of the Ruaha and Uranga rivers, the former of which is reported to be full of rocks, but the latter to be navigable for many days west.

The paragraphs of the letter which refer to our Expedition are as follow :—

“On the upper river the Arab met with people of M'henge, with whom, on a former journey, he had been acquainted, who told him that after Mr. Keith Johnston died, his companion, Mr. Thomson, proceeded in the direction of the Ruaha, before reaching which a marauding party of Maviti (half-caste Zulus) came suddenly upon the caravan. With the exception of five, all Mr. Thomson's attendants are said to have run away, leaving the baggage on the ground. Mr. Thomson told the Maviti that he and the party with him would fire if they dared to take the loads, whereupon the Maviti laid down their shields. Mr. Thomson then ordered them to go and bring back the runaways, promising to pay them. This was done, and, after two days, the party proceeded without further opposition, and crossed the Ruaha. On reaching M'henge, the chiefs all ran off, and remained in hiding on an island until Mr. Thomson's departure. He is said to have passed west from M'henge towards Ubena, and when last heard of was progressing, without difficulty or opposition, in the direction of the lake.”

“I report the above,” says Dr. Kirk, “as told me. Evidently the arrival of white men in the country had caused a panic; but, so far, this had not affected the welfare of the Expedition. At Behobeho the Arab was told of Mr. Keith Johnston's death, and saw the place of his grave.”

We have received, however, by this morning's mail from Zanzibar, later news of our Expedition from the pen of Mr. Thomson himself. He has made rapid progress since leaving Behobeho, after the death of his leader, and reached a place called Mkubwasanya, the chief town of the Uhehe country, some few days' journey north, or north-east, of Lake Nyassa. At the date of writing, August 30th, he was detained, as he expresses it, virtually a prisoner at the caprice of the chief Mamle, but apprehended no serious consequences, and had just been allowed to move on to the next town. In his letter to Dr. Kirk he says he is “in good health, and hopes in a few days to look upon the waters of Lake

Nyassa." With his official letter to us he sends his route-map in eight sheets, and a long report of his journey. I have not had time to do more than glance at this report, from which I can only read you a few short extracts:—

He commences by a feeling allusion to the responsibilities thrown upon him by the death of his chief. "It needs no words of mine," he says, "to speak of the vast loss sustained by the Expedition by the death of Mr. Johnston, eminent as he was in the geographical world, while I, thrown suddenly and unexpectedly into work with which I was totally unacquainted, cannot be expected, at the age of twenty-one, to turn out, in the heart of Africa, a very competent geographer. However, I am directed in my instructions to continue the work in case any accident deprived the Expedition of its chief, and to the best of my ability I am doing so."

From Dar-es-Salaam to Behobeho, the Expedition marched through the broad belt of low-lying country, called *Mrima*, which intervenes between the coast and the elevated plateaus of the interior. Mr. Thomson thus describes this desolate and unhealthy tract of land, in which Mr. Johnston contracted the malady which proved fatal a few days afterwards:—"The country," he says, "may be described as a broad level plain of sand, stretching from the Marui Hills to the sea. During the dry season it must be a burnt-up desert; in the wet season the greater part must be submerged, as even in the lesser rains which we experienced, large tracts were still in that condition. These circumstances prevent the occurrence of an abundant population. The villages are small. The square mud-built huts, with projecting eaves, were after Swahili types, and the people dressed themselves in the same manner as the Swahili. The only articles of commerce are copal and india-rubber. The vegetation is of the most monotonous nature—long tracts of small, stunted trees, unrelieved by flower or creeper, alternating with marsh. Animal life, therefore, is not abundant; few mammals were seen, and the existence of birds was chiefly noted by the hoarse caw of the hornbill, or the exasperating squeak of a small parroquet. The dreariness of these marches can hardly be conceived, and the distant glimpse of a herd of antelope was quite sufficient to excite the whole caravan."

Reaching Behobeho, the landscape became more attractive; he speaks of this place as "a charming village, consisting of a winding line of houses of most varied architecture, and impregnable from its forest-bound walls of tall trees, bound together into an impenetrable mass by woody creepers, outside of which flows a crystal stream, amid the plantations of the villagers." The view is bounded by picturesque hills, which Mr. Thomson visited, and thanks to his geological training, was able to give an excellent description of.

Mr. Johnston died here on the 28th of June; on the 2nd of July the

caravan was again on the march. They were now approaching the country of the dreaded Maviti, or M'henge, a tribe of half-caste Zulus, the terror of the whole country between Nyassa and the Indian Ocean. The description of his first encounter with these dreaded savages bears out to some extent the rumours conveyed to Dr. Kirk by the Arab traveller. A party of M'henge warriors was, in fact, met on the march, and the porters of the Expedition all ran back in a panic; but by a prompt display of courage and friendliness Mr. Thomson avoided a hostile collision and escaped being plundered. Taking Chuma and one of his escort who understood the M'henge language, he went forward to meet the party and established relations of friendship, which seem to have been maintained during the passage of the caravan through the M'henge country.

From the western border of M'henge the country marched through becomes more mountainous, and the successive plateaus are higher and higher. On the 18th of August the Expedition entered on what Mr. Thomson calls the "Great Plateau," 6700 feet high, which at this point is drained by the Ruaha and its tributaries. He describes this elevated region as a "bleak moorland-like country, with one rounded ridge succeeding another, and huge blocks of granite protruding everywhere. The climate is very trying. An exceedingly cold wind blows across the plateau from the north-west, between sunrise and sunset. Under its influence the men shivered, and I have been glad to put on an overcoat at midday." This is the country of Uhehe, through which the party marched for twelve days, i.e. up to the date of Mr. Thomson's letter.

I will not occupy your time with reading more of this interesting report. Mr. Thomson has had the good fortune to be the first European who has visited the great central districts of M'henge and Uhehe, his valuable account of which, together with the rest of his narrative, will be published *in extenso* in an early number of the 'Proceedings.'

The London Missionary Society have had, in addition to the death of two members of their party, to deplore the loss of Dr. Mullens, their Foreign Secretary. He died near Mpwapwa on the 10th of July, on the route between the east coast and Lake Tanganyika. Dr. Mullens, though he had achieved great things as a geographer and man of science, was better known to the world as a missionary and a director of missionary enterprises. He had occupied for thirteen years the important post of Foreign Secretary to the London Missionary Society, and I can testify, from my own knowledge, to the high esteem which was felt for him in India, which was the principal scene of his labours.

With regard to the other exploring Expeditions in the interior of Africa there is little to report, except that the usual obstacles of African travel have interfered with rapid progress. We hear of the continued, though slow, advance of the Belgian International Expeditions, two of which are on their way from the east coast to Lake Tanganyika

and the Manyema country beyond, and one under Mr. Stanley is advancing from the coast *via* the Congo. The caravan of Indian elephants given to the Central Commission by the King of the Belgians, is now several hundred miles from the east coast, on its way to Lake Tanganyika.

The persevering efforts of the German African Exploration Society to extend our knowledge of the western interior of Africa are well-known. During the past summer Herr Schutt, one of the latest of their band of explorers, has returned to Europe, with rich gleanings from the little-known region lying between the Quango and the Kassai rivers, and has recently laid before the Geographical Society of Berlin maps and a report of his Expedition. His successor, Dr. Buchner, was, when last heard of, preparing for a journey to the country of Lunda.—Thus, in western Africa a fair measure of success has attended the recent enterprise of the Germans; but in the north the adventurous attempt of Gerhard Rohlfs to reach equatorial Africa and the Upper Congo from Tripoli, *via* Wadai, has at present been baffled by the hostility of the tribes of the Kufara Oasis.

Major Serpa Pinto, with whose Expedition you are doubtless familiar, arrived in London after our meetings for the summer were over, and when it was too late in the season to summon a special meeting with any prospect of a sufficient gathering to do him the honour which we should have wished. He was kind enough, however, to give an account of his travels at my house to the Members of Council and some persons interested in African travel whom I was able to collect, and he afterwards addressed me a letter, which has been printed in the August number of 'Proceedings.' You will be glad to hear that he intends to do us the honour of publishing the account of his travels in English, and that we may soon expect it to appear.

We were equally or even more unfortunate in the case of the eminent Bohemian traveller, Dr. Emil Holub, who arrived in London in August, when it is almost as difficult to bring together men of science in London as it would be in the southern part of Central Africa, which he has recently visited. Dr. Holub has brought home many maps and drawings, and much valuable information regarding the neighbourhood of the Zambesi River above the Victoria Falls, and I hope that he will be able to give us an account of his travels at our meeting of the 12th of January next.

Turning from Africa to Central Asia, we hear that Colonel Prejevalsky, whose great attainments are well known, had reached Suchow, on the Chinese frontier, on the 20th of June; three months after he left the Siberian frontier of Russia on his way to Lhassa.

A Hungarian traveller, Count Széchényi, in correspondence with the Geographical Society of Berlin, has also been for many months engaged on an exploratory journey to Mongolia and Tibet, but making China

his starting-point. Defeated, by the opposition of the governor of Kan-su, in his first attempt to reach Lob-nor Lake by way of Lan-chow-fu, he had obtained, by diplomatic intervention, a more direct authorisation from the Chinese Government, and made a fresh start in July last for Lake Koko-Nor, intending thence to take the route by Sining and Tsaidam Plain; but whether his ultimate destination is Lhasa or Lob-nor is not clear from the reports we have received.

Additions to our geographical knowledge have been made by the surveying officers who accompanied the different columns during the recent campaign in Afghanistan. The results will no doubt be in due course made known in the form of a revised general map of the country, by General Walker; meantime it may be recorded that descriptive papers of much interest and value have been received by us from Captain Holdich and Lieutenant R. C. Temple, relating to the Thal-Chotiali route; from Captain Gerald Martin on the Kurram Valley (published in the October number of our 'Proceedings'); from Captain R. Beavan, on the country between Candahar and Girishk; Lieutenant St. George C. Gore, on the Pishin Valley; Major Campbell, on the Toba Plateau; and Major Malcolm Rogers, on the district of Candahar. Most of these descriptive papers were read in an abridged form at the Geographical Section of the British Association, and abstracts have been given in our 'Proceedings.'

Proceeding from east to west, the last subject I have to notice is the Expedition of Mr. Wilfred Blunt, accompanied by his wife, Lady Anne Blunt, to Central Arabia. The interesting account of their former journey by Lady Anne will be no doubt in the recollection of most of you, and will cause you to look forward to the account of their visit to the region described so eloquently by Palgrave, which Mr. Blunt will, I hope, give us on the 8th of December.

The Paper I have selected for reading this evening is one drawn up by Professor Veth, of Leyden, on the Dutch Expedition to Central Sumatra in 1877-79, of which the learned Professor's son, Mr. D. D. Veth, was a member. It is one of many papers we have in hand which labour under the disadvantage that their authors are not present. The paper will be read by Mr. Markham.

*The Dutch Expedition to Central Sumatra.**

By Professor P. J. VETH, Honorary Corresponding Member R.G.S.

(Read at the Evening Meeting, November 10th, 1879.)

If it be allowed "*parvis componere magna*," a parallel might be drawn between the history of Sumatran and African discovery. In both, the

* A map of Sumatra, in illustration of this paper, is in preparation, and will be issued with an early number next year.—Ed.

work commenced with maritime exploration and was pushed forward by commercial settlements, through disputes with natives ending in wars, requiring the aid of scientific expeditions for its completion. In both, traffic and politics have opened the way, and made us acquainted with the coasts and more or less extensive adjacent regions; leaving the interior undisclosed until religious zeal and the thirst for knowledge combined to push back the limits of the unknown. Excepting a few tracts of minor extent and importance, the central parts both of the immense continent and of the relatively large island withstood to the last the efforts of the pioneers of civilisation. What, until 1877, the River Congo was to the explorers of Africa, the River Jambi was, until about the same period, to those who take an interest in the fuller geographical knowledge of Sumatra.

English literature may boast of having produced the best and most exhaustive general work on Sumatra, previous to the reduction of the Dutch colonies in the Indian Archipelago by the conquest of Java. Indeed, Marsden's 'History of Sumatra' ranks as high among the authorities for that island as the 'History of Java' by Sir Stamford Raffles does among those for its smaller but more celebrated neighbour. Both these works, however, are now to a certain extent antiquated, as each succeeding year has brought numerous contributions to our knowledge of both these islands. With respect to Sumatra, we have become very much better acquainted with the northern province, owing to the disastrous war which has been raging since 1873, and which still gives little promise of a speedy termination.

In 1843 great part of the Batak country was carefully explored by the celebrated Junghuhn, and a knowledge of its language and literature was afterwards supplied through the travels and studies of the able linguist Neubronner van der Tunk. By the annexation of the Sultanate of Siak to Dutch territory in 1858, moulded in 1873 into the new Residency of the "East Coast of Sumatra," fresh scope was afforded to commercial and agricultural enterprise, and a considerable increase of our knowledge of the country was the natural consequence. With the extensive empire of Menangkabau, in every respect the most interesting part of the island, Marsden was only superficially acquainted. It now forms the government of "West Coast of Sumatra," divided into the Residencies of Tapanuli, Padang, and the Padang Highlands, the first including part of the Batak country and some tracts formerly belonging to Achen.

The protracted war, lasting with brief interruptions from 1821 to 1837, and ending in the conquest of the once famous Empire; the surveys of Beyerinck (1843-47) and Cluysenaer (1873-75); the geognostic researches of the engineers de Greve, Verbeek, and others which led to the discovery, in 1869, of immense deposits of excellent coal near the River Ombilin; the notes of numerous scientific travellers, among

whom the names of Korthals, van Oort, Horner, Muller, Osthoff, Teysman, Cordes, Ludeking and Beccari deserve especial mention — these form the principal steps by which we have gradually acquired a much more accurate knowledge of these parts than anyone could boast of in the beginning of this century.

The Residency of Bencoolen, on the southern part of the west coast, of which the Dutch became masters by cession from England in 1824, has been well studied by Marsden, yet even here our knowledge has since been considerably extended, partly through the researches of British travellers while Raffles was Lieutenant-Governor of Fort Marlborough, partly through those of Dutch officials and tourists, including the comprehensive though superficial survey by Major Steek in 1856, which forms the somewhat frail basis of our present maps.

The Lampong districts, forming the southernmost Residency of Sumatra, were surveyed in quite as superficial a manner by the same officer. But we derive highly interesting information on this country from the travellers Du Bois, Zollinger, Köhler, and Neubronner van der Tunk.

The extensive and celebrated province of Palembang has become infinitely better known since Marsden's time in consequence of the wars carried on between 1819 and 1825 ending in the suppression of the Sultanate, of the subsequent expeditions for pacifying and annexing the semi-independent provinces of the interior, of the surveys of Major Steek and others, and of the contributions to our knowledge by Captain Salmond, Presgrave, Court, de Sturler, Prætorius, Gramberg, Teysman, Wallace, Mohnike, and others.

To the north of Palembang, filling the space between that province and the East Coast Residency, lie the native states of Jambi, Indragiri, and Kampar. The first is considered as an appendage of Palembang, the second as a fief of the Sultan of Lingga, and therefore belonging to the Residency of Rio, and the third as being, to a certain extent, connected with Siak, on which it was formerly dependent. Of this part of Sumatra our knowledge is still very scanty. The Kampar River is almost entirely unknown. Of the Indragiri River (called also higher up the Kuantan River, and in its upper course, through the Padang Highlands, the Ombilin) the middle course is unexplored. Of the Jambi I shall say more presently.

The Dutch Geographical Society, from the date of its foundation in 1873, considered it to be, not its only, but its most important task to fill up gradually the numerous gaps still existing in our knowledge of the Indian Archipelago. As Sumatra has recently engaged much attention on account of the Achenese war, the sudden development of agricultural industry in the East Coast Residencies, and the discovery of the coal-fields of Ombilin, the Society was impressed with the fact that one of the most interesting divisions of the island, though nominally under the

government of Netherlands India, had been left almost entirely unexplored. The Sultanate of Jambi is conterminous, on the west side, with the Padang Highlands and Bencoolen, on the south with Palembang, on the north with the districts dependent on our vassal, the Sultan of Lingga. It is watered by a fine navigable river, which has its source in our own territory, and may possibly be used for the transport of the Ombilin coal. Jambi comprises the inland districts of Pankalan-Jambu,* Batang-Asei, Limun, Korinehi, Serampeï, and Sungei-Tenang. Some of these districts have excited curiosity by the fame of their natural beauty, their mineral wealth, and the number and industry of their inhabitants. This Sultanate was almost a *terra incognita*, although, in its immediate neighbourhood, the towns on the west coast had long been connected by that symbol of advanced civilisation, the electric telegraph.

The project of an expedition to Central Sumatra was first started by Colonel Versteeg, at the fifth general meeting of the Society, held at Rotterdam on the 20th of June, 1874. It was warmly commended by Prince Henry of the Netherlands, patron of the Society, and was finally adopted with general approval. The original project was to embrace the whole area watered by the Jambi River (which I will henceforth call by its native name of Batang †-Hari) and its affluents, from their sources to their common embouchure.

In consequence of this resolution, special inquiries were set on foot by the Council, for which the aid of Government was sought and readily granted. The Indian authorities were consulted, and found to be favourable to the expedition, and many interesting documents were forwarded from India, which enabled Colonel Versteeg to submit a more definite plan to the general meeting of the Society which met on December 4th, 1875. It was then decided that the expedition should consist of two sections, one travelling by land, in order to explore the sources of the river, and its affluents in the Padang Highlands; the other making use of a steam launch, or other small craft, to explore the river from its mouth upwards, and to penetrate either by the head river or its affluents, as far as they might be found navigable.

The scheme being so far advanced, the Council resolved to entrust its further management to a committee of five members, which, in the course of 1876, collected the necessary funds for the expedition through private subscriptions and Government aid. The Government not only granted a subsidy, but gave the free use of a new steam launch destined for Indian service, and many other facilities. As soon as the possibility of carrying out the project was ensured, a choice was made from among the numerous candidates who wished to join the expedition. Lieutenant Schouw Santvoort, of the Royal Dutch Navy, was selected as chief of the

* The name is derived from the Jambu fruit. Pankalan-Jambu is a corruption.

† *Batang* means river.

expedition, and to command the launch. He immediately set to work, with zeal and alacrity, to supervise the equipment, to procure the necessary instruments, and to collect all existing information concerning the region to be explored.

It will be agreeable to the British public to learn that all the existing information respecting the inland districts of Korinchi, Pankalan-Jambu, Serampeï, and Sungei-Tenang was derived from English sources. The notes preserved by Mr. Marsden of a visit to Korinehi by the botanist Campbell, and of two military expeditions commanded by Lieutenant Dare to Serampeï and Sungei-Tenang, and the narrative of a voyage from Moko-Moko to Korinchi and Pankalan-Jambu by Thomas Barnes, printed in part in the 'Malayan Miscellanies,' contained the only trustworthy notices of these interesting regions. It was, however, a great drawback that the publication of Barnes's voyage had been left imperfect by the suspension of the publication of the 'Malayan Miscellanies,' and that even the map of this journey was wanting. The Dutch Geographical Society, therefore, is greatly obliged to Mr. Clements Markham, whose kindness procured it a complete copy of Barnes's journey from the original manuscript, and the accompanying map. This has proved to be of considerable value, for it has served partially to fill up the gaps left in the work of the Sumatra expedition, owing to the hostile attitude of the natives of the interior, which, in some instances, impeded its progress, and in others led to prohibitions on the part of the Government, anxious lest it should be involved in new difficulties while the war with Achen was still raging.

Lieutenant Schouw Santvoort had, as his colleagues, Mr. Makkink in the capacity of mate, and Mr. Hermans as machinist. The rest of the crew, consisting of native sailors and stokers, were to be ready on his arrival at Batavia; whither the launch was conveyed free, of course, by the Netherlands Steam Navigation Company. The other members of the expedition were Mr. D. D. Veth a civil engineer, and Mr. J. F. Snelleman the naturalist. As chief of the second section it was thought advisable to select some one who was well acquainted with the language and customs of the country, and, on the recommendation of the Governor of "Sumatra West Coast," Mr. A. L. van Hasselt was appointed. He was to join his colleagues at Padang.

The party started from the Helder on January 13th, 1877, and arrived at Padang on February 23rd, where they were received by van Hasselt. Schouw Santvoort, though bound for Batavia in order to take command of the steam launch, disembarked with his colleagues at Padang, sending on the mate and machinist to take charge of the vessel during his absence. Before leaving Amsterdam he had asked and obtained permission from the committee to inaugurate the expedition by making a journey across Sumatra from Padang to Jambi, unaccompanied by any European, provided that the Governor of "Sumatra West Coast"

considered it feasible. After having accomplished this journey he was to proceed from Jambi to Batavia for the launch, with which he was to continue the exploration of the river. As the Governor was willing to promote this plan, Schouw Santvoort resolved to adhere to it.

It will be well here to give a slight sketch of the political condition of Central Sumatra, which in itself was one of the most important discoveries made by the expedition.

The Sultanate of Jambi was, in former times, immediately contiguous with the empire of Menangkabau. The exact limits cannot now, and probably never could have been, determined with accuracy, as the colonists from Menangkabau gradually multiplied in the adjoining uninhabited wilds. At all events, it is certain that the district called Rantan-di-Baroeh or Rantan-Batang-Hari (extending along both sides of the great river down from the point at which it leaves our present territory near Gasing, to Tanjung and Simalidu, the first villages of the Jambi territory) belonged to Menangkabau. To the south of the bend northwards, made by the Batang-Hari at a little distance from Gasing, some other Menangkabau communities are to be found, in the district now called Tebo and Bunga, partly on the banks of the Yujuan, an affluent of the great river, and partly about the sources of the Batang-Tebo, at the foot of Gunung-Tudjuh, a mountain ridge north-east from the peak of Korinchi.

By the conquest of Menangkabau, in consequence of the Padri wars,* the whole of the empire was nominally brought under the Dutch dominion. But the nature of a Malay State rather resembles a feudatory republic, composed of a great number of small and semi-independent communities, than a true monarchy. It is held together by the authority of a sultan with little power, and an object rather of veneration than obedience. This was the reason why the Dutch supremacy could only be maintained as far as it was enforced by the strong arm. Petty wars raged in the Padang Highlands until 1845, the territory acknowledging Dutch authority being gradually extended to the present limits of the provinces, and in some directions a little further. But the remote communities belonging to the Rantan-di-Baroeh maintained or relapsed into a dubious independence, differing in degree according to the disposition of the inhabitants and the ambition and energy of their chiefs. The most audacious and most influential of these petty potentates is the Raja of Siguntur, whose residence is situated at the northernmost point of the northern bend of the Batang-Hari. Siguntur, long left to itself, at present affects complete independence, obstinately refuses all connection with the Dutch, and enforces, by its influence, a similar policy in the neighbouring petty States of Pulo-Panjong and Sungei-Kambut. The other small Rantan States,

* The Padris were a religious sect in Menangkabau, fanatics with doctrines like the Wahabees. Their wars led to Dutch interference 1833-34.

Takang on the Pangéan (the northernmost affluent of the great river) and Lubukh-Ulang-Aling, lying along the Batang-Hari to the south of its union with the Mamun, acknowledge the Dutch supremacy, and are independent rather from neglect on the European, than from presumption on their own side. Sungei-Kunjeit, Indamar, and Tanjang-Alam on the Yujuan are only connected with Dutch government by their hereditary allegiance to the chief of Sungei-Pagu, who holds in that division the post of chief native functionary.* Talan and Sungei-Liman, at the foot of the Gunung-Tudjuh, are very little known, but seem to stand in a similar relation to the native chief of Pasimpei, in the adjacent division of the XII. Kotas.

In 1834 the Dutch Government made a contract with the State of Jambi, the sultan at that time seeking the protection of a stronger power against the turbulence of his own vassals. But his successor, who ascended the throne in 1855, refused allegiance to his European masters. After various warnings an expedition was sent in 1858, which stormed the Kraton and drove out the sultan. His uncle, the present Sultan Ahmed, was then set up in his place. The former sultan, generally called Sultan Taha, fled into the interior, and was not pursued. The Dutch, content to be masters of the coast, by establishing a post at Jambi, and appointing a Political Agent to the new sultan's court, and receivers of duties at the entrances of the principal rivers, patched up a government for part of the kingdom only. Sultan Taha was left unmolested, and the chiefs of the interior were allowed to shift for themselves.

At the time when the expedition was equipped, the real relation in which the two sultans of Jambi stood to each other was entirely unknown. Thanks to the knowledge acquired by the expedition, we now learn that the old sultan established himself at Telukh-Rendah on the Batang-Hari, near the mouth of the Tahir; that his authority, as far as it ever went, is still acknowledged by all the chiefs along the Batang-Hari and its affluents down to the mouth of the Tambesi; that the present sultan, unable to enforce their obedience, acquiesces in this state of things and does not even pretend to exert any influence beyond the point indicated; and that Sultan Taha, as was to be expected, bears a mortal hatred to the Europeans who strove to deprive him of his power, and spares no means to excite the different chiefs against any person who may be considered as an agent of the Dutch Government.

This then was the reason why the expedition under Mr. van Hasselt was refused entrance into the district of Batang-Asei, and was expelled from Limun, and why even the steam launch was impeded in her progress by menaces at Telukh-Benkal on the Batang-Hari, and by actual resistance at Ladang-Panjang on the Tambesi. Our gallant travellers, unaided by any military force or official authority, and clogged by instructions which made it their chief duty not to involve Government in

* The chief native functionary in every division, or *laras*, is called *Kapala-laras*.

any difficulties, were unable to overcome the obstacles thrown in their way.

This is the explanation of the exploration of Central Sumatra having been left imperfect, notwithstanding the most strenuous efforts, and why the blank space on the map, though considerably reduced, has not entirely disappeared. The two sections of the expedition have never been able to join, except in so far as that both van Hasselt and Veth, towards the end of their labours, have visited Mr. Cornelissen, the successor of Schouw Santvoort in the command of the launch, by proceeding from Palembang to Jambi by sea. The distance which separates the two furthest points of the expedition, downwards and upwards, from the mouth of the Mamun to Simalidu, will probably not exceed 40 miles following the windings of the river. The distance from Ladang-Panjang on the Tambesi, the utmost point reached by the launch, and Temiang on the River Limun (connected with the Tambesi through the Batang-Asei), the utmost point reached in this direction by van Hasselt and Veth, will not be much more than 30 miles.

I now pass to a brief account of the different routes and stations of the travellers, beginning with Schouw Santvoort's journey across the island.

Schouw Santvoort left Padang towards the end of March, 1877, proceeding by the shortest way to Bedar-Alam in the XII. Kotas, where he was joined by Tuan Ku di Sembah, the native chief (Kapala-laras) of Sungei-Panu, whom Government had pointed out as the fittest person to accompany him on account of his credit with the Menangkabau chiefs on the Yujuan. On April 4th he crossed the Sungei-Ekem, forming the frontier between the Padang Highlands and the Tebo and Bunga district. Following the course of the Yujuan, he crossed the territory of Sungei-Kunjeit, Indamar, and Tanjang-Alam, until then entirely unknown, reaching the Jambi territory on the 10th. At Rantan Ikin (the head village of a chief, with the title of Tumenggung, dependent on Jambi), he was left by his companion and most of his followers. But the Tumenggung, whose good opinion he was so fortunate as to gain, allowed him to equip a boat, and furnished him with an escort. Though generally the object of suspicion and ill-will, he had hitherto overcome all difficulties by calm and prudent conduct. But on reaching the point of the junction between the Yujuan with the Batang-Hari at Telukh-Kaya-Putih, and so entering the region under the immediate sway of Sultan Taha, on the 13th, he was exposed to actual danger, which he only eluded by proceeding in the most unostentatious and clandestine way possible. On the 17th he reached Dusun-Tengah, the capital of Sultan Ahmed, but at once rowed on to Jambi, to meet the Political Agent, Mr. Niesen, the chief representative of Government in those parts, who received him with the greatest cordiality. On the 20th he continued the journey to Palembang, following an unusual route, partly by land

and partly by water, and reaching the capital on the 27th, just in time to embark in the mail steamer, arriving at Batavia on the 29th.

The amount of information collected by Schouw Santvoort during this rapid and perilous journey is truly astonishing, and all subsequent experience has tended to confirm the correctness of the views he formed respecting the state of the country.

On June 17th, Schouw Santvoort was back at Jambi with the steam launch completely equipped, but as the mate, with the instruments, could not arrive until the 25th of July, he was unable to enter upon his regular work at first. Nevertheless, his time was most usefully employed in visiting the sultan and other chiefs, in collecting information, in trying the qualities of his vessel, and in various excursions to the settlements at Saba and Muara-Kompeh, to the lakes in the vicinity of Dusun-Tengah, and to some Hindu antiquities at Muara-Jambi. After the arrival of the mate, he was still detained some weeks at Jambi by a series of little accidents very trying to his patience, and also by the unusually low level of the water in the Batang-Hari, which lasted through the whole of the dry season of 1877. However, this was favourable for the survey of the lower part of the river, which was accordingly executed with great accuracy. It proved impossible to ascend higher up than Dusun-Kuab, only a little above Sultan Ahmed's residence of Dusun-Tengah. Under these untoward circumstances, the draught of the launch proved to be too much for the service required of her. At the same time the reports as to the state of feeling in the interior, and the disposition of Sultan Taha, who was highly incensed at the voyage stealthily made by a European across his dominions, became more and more alarming. Even Sultan Ahmed began to tremble for his safety, and implored the aid of the Political Agent. That officer adopted measures which induced Sultan Taha to seek greater security by flying up the inaccessible Tahir River.

Meanwhile, Schouw Santvoort, despairing of being able to proceed with the survey of the Batang-Hari before the setting-in of the monsoon, resolved to go by sea to the mouth of the Tonghal, a river to the north of the Batang-Hari, and to explore it as high up as possible. With this object in view, he left Jambi on October 29th, reaching the mouth of the Tonghal on November 1st. On the 3rd he arrived at Tungung-Puehung, where, finding his progress obstructed by heavy trunks under water, he was obliged to turn back. On the 7th he was again in the mouth of the Batang-Hari. Here his heart was gladdened by the news that an understanding between Sultan Ahmed and the Pangéran Ratoe (Crown Prince), who had hitherto taken the side of the Sultan Taha, had considerably improved the prospects of his intended voyage up the river, and that the early rains promised a speedy rising of the waters.

He was now animated by the most sanguine expectations. Yet the rising came on very slowly, and he had not been able to make a new trial, when a sudden and entirely unexpected death overtook him. He

had passed the evening of November 22nd cheerfully with the family of Mr. Niesen. In the morning of the 23rd he was found dead in his bed, without any sign of pain or contortion, and in the attitude of the most tranquil sleep.

Meanwhile, the other travellers, under the able guidance of Mr. van Hasselt, after some stay at Padang, and a tour to the Fort-de-Kock, with the view of making some arrangements with the Resident of the Padang Highlands, began the survey of the southern division of that province, known by the name of IX. and XIII. Kotas, and embracing the subdivisions of Solok, Supayang, Lolo, and Sungei-Panu. They arrived at Solok on April 2nd, and, after due preparation, proceeded on the 15th to Supayang, which place they had chosen for their first station. Their other successive stations were at Silago, Sijungjung, Alahan-Panjang, and Muara-Labu; their head-quarters in the last visited district of the XII. Kotas being divided between Lubukh-Gadang and Bedar-Alam.

Starting from these different stations, as so many centres of operations, Veth surveyed the whole of the IX. and XIII. Kotas, making excursions on foot or on horseback through the wildest and most desolate, as well as through the most populous and cultivated tracts, trying by boat the navigability of every affluent of the Batang-Hari, taking photographs of every interesting site, collecting geological specimens, keeping a meteorological journal, and climbing the two highest and most remarkable mountains in the country. Both these mountains are volcanoes, not entirely extinct, namely Mount Talang, near Alahan-Panjang, distinguished by its beautiful cluster of lakes, and the never-before ascended peak of Korinchi, measuring about 3600 metres (11,820 feet), and probably the third or fourth mountain in height in the whole archipelago, New Guinea excepted.*

Though prevented by the hostile demonstrations of the Raja of Siguntur, and the subsequent interdict of Government from thoroughly exploring the Rantan-di-Baroeh, and taking a view of the Menangkabau communities in Tebo and Bunga, Mr. Veth contrived to visit the friendly Kota of Takung, to ascend Mount Sula to the north of Siguntur, to navigate the Batang-Hari from the mouth of the Pottar to that of the Mamun, and afterwards from Gasing to the mouth of the Pottar, all places situated beyond the actual limits of Dutch territory. By these means he ascertained the course and navigability of the Batang-Hari from Gasing to Siguntur. He also discovered the extent of its northern bend along our frontier. He was the first to discover this bend, all preceding maps representing this river as flowing from Gasing directly eastward. The circumstance of this bend bringing the river so much nearer to the coal-field on the Ombilin, induced him to

* The peak of Korinchi seems to be surpassed in height by Gunong Rinjani on Lombok, Gunong Semeru in Java, and perhaps Gunong Kinabalu in Borneo.

explore the intervening country and part of the River Kuantan (as the Ombilin is called in its middle course). He also wished to trace the direction in which a railway might be constructed, for bringing the coal to the river. The coal would be of much greater value if brought down to the east coast than to any part of the west coast, on account of the vicinity of Singapore and Batavia. The Batang-Hari, too, is probably more fit for the conveyance of the mineral than the Ombilin.

Mr. Veth, being prohibited by the Government from entering Korinchi, obtained a view of that interesting valley, with its lake and surrounding mountains, from the top of the peak. The knowledge thus acquired, together with oral information diligently collected, tended materially to correct our notions of that country.

In all the more interesting and more dangerous parts of these excursions, the geographer of the expedition had constantly at his side the intelligent chief van Hasselt, to assist him with his experience and knowledge of the language, and with his ready pencil where the opportunity for taking photographs was wanting. At the same time, van Hasselt made most diligent researches with reference to the manners and customs of the inhabitants, their traditions and superstitions, and the state of agriculture. He brought together a large number of documents serving to illustrate the little-known Malay district of Menangkabau, so different from the ordinary Malay, either written or spoken, and an ethnological collection of extraordinary completeness. In forming this collection he was materially assisted by the naturalist Snelleman, who, though generally limiting his excursions to the more immediate neighbourhood of the places chosen as stations, saw his immense zoological and botanical collections constantly increased by the contributions snatched by van Hasselt in the wilds.

After finishing the intended survey of the southern part of the Padang Highlands, our travellers returned to Padang in January 1878, whence they intended to go by sea to Bencoolen, and then to cross the range of mountains separating the Residency of Bencoolen from that of Palembang, in order to make a trial of penetrating into the interior of Jambi from the southern side, avoiding the forbidden districts continuous with the Padang Highlands. The Resident of Palembang expected that they would be favourably received in Limun, and that this would pave the way for their ulterior researches. High hopes were entertained of the success thus promised, but on their arrival at Padang they laboured under considerable depression of spirits, on account of the unpropitious tidings they received from various quarters. From Jambi they had been informed of the sudden death of their friend Schouw Santvoort; from Amsterdam a letter was received containing the recall of Snelleman as a measure of unavoidable economy; from Palembang the Resident intimated that their best course would be to come there by way of Batavia, a hint which they could not neglect as coming from so

high an authority, though contrary to their own views as to the true interests of the expedition.

Snelleman left Padang with the mail steamer to Batavia on January 26th, and reached home on March 9th, the same day on which Lieutenant C. H. Cornelissen of the Dutch Royal Navy, chosen as the successor of the deceased chief of the expedition, left the Helder, bound for Batavia. Van Hasselt and Veth set out for Batavia on March 7th. They reached Palembang on March 22nd, where they were joined by Lieutenant Cornelissen on the 12th, who had with him a new machinist, named Snijdwint. We now enter upon the second period of the expedition.

Meanwhile, however, an important exploring expedition on the Batang-Hari was undertaken by Mr. Pruys van der Hoeven, the Resident of Palembang, in the Government steamer *Barito*, from February 4th to 26th, 1878. This expedition was undertaken partly to enforce the authority of the sultan upheld by the Dutch Government in the interior, by an imposing demonstration. The Resident was also desirous, after the reports that had reached him of the practicability of railway communication between the Ombilin coal-fields and the Batang-Hari, to judge by his own observation of the value of the river as a highway for traffic. He took with him Mr. Niesen, the Political Agent, and Mr. Makkink, the mate of the steam launch, to whom the scientific work was entrusted. Makkink, though very young, showed during this service how well he had profited by the lessons of his beloved chief, Selouw Santvoort. He made an excellent map of the river, and determined latitudes and longitudes with great accuracy. The Dutch Geographical Society owes it to him that the voyage of the *Barito* (which, owing to favourable circumstances, ascended the river higher than the steam launch had ever done, and reached the Rantan frontier at Simalidu and Tanjung) was serviceable to science. So far as its geographical results are concerned, the voyage of the *Barito* may be considered as part of the Central Sumatra Expedition.

When van Hasselt and Veth reached Palembang, the *Barito* had returned, and was ordered to transport them to the scene of their future labours by the River Musi and its affluent the Batang-Rawas. They reached Muara-Rupit on April 2nd, and thence proceeded by land to Surulangun, the residence of the chief Government officer in the Rawas district, where they expected to find everything prepared for their entrance into the adjacent country of Limun. In this expectation they were most cruelly deceived. It appeared that there was one chief of some influence in that country, called Payung-Putih, who favoured the Dutch Government, but that all the rest sided with Sultan Taha, and were decidedly adverse to admitting our travellers. Pending the negotiations with Payung-Putih, they made a tour through the Rawas district, and tried to enter the territory of the Batang-Asei, a tributary

of the Tambesi, and itself the recipient of the Limun River at Muara-Limun.

The Batang-Asei district, also part of Jambi, though the people speak the Malay of Menangkabau, has Rawas and Limun to the south, Limun to the east, the upper Ulu-Tambesi district or Serampeï to the north, and Sungei-Tenang to the west. Our travellers met with the chiefs on the frontier, and found them very well disposed. At the same time, however, they declared it to be impossible to admit strangers without the express orders of their sovereign, the Sultan Taha. Baulked of their purpose, the travellers, after ascertaining that no tidings from Payung-Putih had yet been received, resolved to visit the Palembang district of Lebung, which proved to be one of the most beautiful and interesting regions of Sumatra, and so preposterously laid down on existing maps that a more careful survey was in the highest degree desirable.

The way from Rawas to Lebung lay through an entirely unexplored and almost impervious, but eminently picturesque wilderness, and over a mountain ridge separating the waters of the Batang-Rawas and those of the Kataun, the principal river of Lebung. Having traversed this country in every direction, our travellers proceeded from Tapus, the chief village of Lebung, to Kapayang in the district of Rejang, where, taking their route through the mountainous district of Sindang, they returned to Surulangun on June 17th. During this interesting excursion Mr. Veth took many beautiful photographs at first, but it proved impossible, owing to the want of coolies and the difficulties of the road, to carry the apparatus into the Lebung country. During this tour Mr. van Hasselt made diligent researches into the various dialects of the Rejang language, quite distinct from the Malay, but never yet studied. He investigated the Renchong alphabet, which is peculiar to these regions, and collected every fragment of literary composition or traditional lore he could lay hands on, besides inquiring into the manners and institutions of the people.

On returning to Surulanguu, the explorers were at last informed of the result of the negotiations with Payung-Putih. In their absence he had been to that place in person, and declared his readiness to receive them. Unhappily his power proved to be unequal to his good-will. Leaving Surulangun on June 28th, the travellers were detained several days near the frontier. At last they proceeded, under the protection of the friendly chief, on July 6th, reached Kampong-Pondok, on the Limun River, on foot, and Temiang, the furthest point of their progress, by water. Here they were informed that several chiefs had mustered their forces in order to expel them. They determined to retreat calmly, under favour of a moonlight night, by rowing up the river to Menkadei. Hearing that further retreat by water was no longer safe, as their enemies had mustered in force at Kampong-Pondok, they continued

their retreat by a rugged footpath, leading to Sungei-Baung on the Batang-Rawas, whence they returned to Surulangun in the evening of July 9th.

Here further tidings of Payung-Putih were waited for, but when they at length arrived on July 28th, they were so unfavourable, that all hopes of penetrating into the inland Jambi districts from the Palembang side were considered to be at an end.

It was now resolved that van Hasselt should proceed to Jambi by way of Palembang, to consult with Cornelissen and the Political Agent as to what remained to be done or attempted. Mr. Veth, meanwhile, was to pack the collections and baggage, and forward them to Palembang. He was then to cross on foot, by a circuitous route, the whole breadth of the Residency of Palembang, and to await the return of his friend from Jambi, at the capital.

Meanwhile Cornelissen had twice succeeded in penetrating far into the inland districts in the steam launch, but on both occasions he had been compelled to return by the menacing attitude of the natives. His first voyage was made between June 19th and July 4. He proceeded up the Batang-Hari as far as Telukh-Benkal, a few miles below the furthest point reached by the *Barito*. Cornelissen feared lest the enmity of the population might prove a serious danger, in the event of the launch grounding, and he, therefore, resolved to retire. On the voyage back, he explored part of the Tebo River, and steamed up the Tambesi as far as Rangkingling, whence he was obliged to return from want of coal.

In undertaking his second voyage, Cornelissen had in view the completion of the survey of the Tambesi, at the mouth of the Batang-Asei, and there to meet van Hasselt and Veth, who hoped to reach that place with the aid of Payung-Putih. He left Jambi on the 16th of July, taking with him the Political Agent and Raden-Hasan, son-in-law of Sultan Ahmed. On the 22nd he passed the mouth of the Marangin, the great affluent through which the Tambesi communicates with the lake of Korinchi. Hitherto all had gone well, but on the next day, steaming towards Ladang-Panjang, he was disturbed by a clandestine shot from a *ladang* (dry rice field) on the river bank. On approaching a village, it was found that a great mob had collected under the guidance of some fanatical haji, and seemed resolved to prevent either his landing or his passage. Requesting Raden-Hasan to land and inquire into the cause of the disturbance, he soon received a reply that Europeans would by no means be suffered to pass. Being unprepared for hostilities, nothing remained but to return. He came back to Jambi on July 25th.

Cornelissen was soon afterwards informed of the similar disappointment of his colleagues, by Mr. van Hasselt who reached Jambi on the 12th of August. Reports also arrived that the spirit of resistance had spread more and more among the people of the interior. The Resident

of Palembang had made a proposal to the Government to maintain its authority by erecting a fort at the mouth of the Tahir; but this plan was not adopted.

Van Hasselt returned from Jambi overland, nearly by the same route that had been followed by Schouw Santvoort when he made his journey across the island. Meanwhile Veth left Palembang on September 10th, and proceeded to Jambi, where he made several trips up and down the river in the steam launch for the purpose of taking photographs. Departing from Jambi, Veth finally left Sumatra on October 14th, arriving in Holland on February 8th, 1879.

Van Hasselt left Palembang on September 26th, 1878, remained some time at Batavia, and then proceeded to the Padang Highlands, to study, with the aid of intelligent natives, the literary and linguistic documents he had collected. He accomplished this during a sojourn of some weeks at Paya-Kumbok, the head village of the L. Kotas, and returned to Batavia towards the end of November. Here he obtained leave to proceed home, with a view to giving his aid in the publication of the results of the expedition; and arrived in Holland last May.

It had been previously arranged that Cornelissen, after finishing his work in the service of the Geographical Society, should not return to Europe, but rejoin the naval service in India. He remained at Jambi completing his maps, arranging his reports, and collecting information until March 1879. On the 14th of March he left Jambi, accompanied by Makkink, and proceeded to Batavia, where Makkink obtained a passage home in the same mail steamer which took van Hasselt to Europe.

In the regions visited by the Sumatra expedition, the most important feature—the River Batang-Hari—has, through the labours of its members, from the least known of the great rivers of Sumatra, become the one most carefully explored. Until now the Musi or Palembang River was considered to be the largest stream in the island, but since the Batang-Hari has become so much better known, it appears to be by no means inferior to the rival stream. The direct distance from the source to the mouth, in a straight line, is in both cases almost equal, viz. 340 kilometres (210 miles), but the actual length, putting aside the windings of the upper course, exceeds 800 kilometres (490 miles) for the Batang-Hari, and is not much more than 600 (370 miles) for the Musi.

For smaller *prahus* the Batang-Hari is navigable downwards from the mouth of the Sibiti, which joins it in the centre of the southern Padang Highlands. It is, therefore, practicable for the transport of merchandise over a length of 760 kilometres (480 miles), while the Musi is fit for such transport only over a length of 540 kilometres (330 miles).

The Government steamer *Barito*, a paddle-wheel boat with a draught of 16 decimetres ($3\frac{1}{2}$ feet), could navigate the Batang-Hari without any difficulty as far as Simalidu, that is over a distance of 600 kilometres

(370 miles), or three-fourths of its length. On the Musi it could not ascend higher than the mouth of the Rawas, a distance of 340 kilometres (210 miles), or not much more than half the length of the river.

Any comparison between the affluents of the two rivers would be unsafe, owing to the incompleteness of our knowledge. The Batang-Hari can be reached by the Sangir from the heart of the XII. Kotas, and is connected with some of the most beautiful and fertile districts of the Padang Highlands by the Pottar, the Mamun, and the Pangéan. Of the Yujuan, Tebo, and Tahir, which bring the tribute of their waters from the provinces to the west, the second is by far the most important, and was found, in its lower part at least, to be navigable for the steam launch; whilst both the others can certainly be navigated by native boats. The largest of the affluents of this great river, the Tambesi, connects it with Serampe, and by its tributaries, with Korinchi, Batang-Asei, and Limun. The Tambesi was navigated by the steam launch over a distance of 150 kilometres (93 miles), beyond which point she was stopped, not by want of water, but by the enmity of the natives. The Marangin, by one of whose upper branches the lake of Korinchi discharges its superfluous waters, is a large but tortuous river, whose lower part proved to be navigable by the launch. That the Limun River, a mere branch of the much larger Batang-Asei, begins to be navigable for *prahus* near the Rawas frontier, was proved by Mr. van Hasselt and Mr. Veth.

The population of the territory watered by this river and its branches is, on the whole, scanty; yet along its entire course and those of its chief affluents, numerous small villages are found at short distances from each other. Siguntur appears to be populous, judging from the extent of its rice fields, and the considerable importation of cattle from Rantan-di-Baroeh to the Padang Highlands argues a numerous stock. Cattle are also exported, on rather a large scale, from Tebo and Bunga through the XII. Kotas. Coffee abounds in Korinchi, and in several districts the produce of gold seems to be capable of considerable development.

The importance of the Batang-Hari, therefore, is far from merely depending on its fitness for the transport of the Ombilin coal. It has been observed, with perfect justice, by the Resident of Palembang, in his report on the voyage of the *Barito*, that this mighty river is navigable over a longer course than any other in Sumatra, and that it is eminently important for communication and commerce both with the eastern parts of the "West Coast Government," and with the inland districts of Jambi and Korinchi. But to make these advantages really available, it is of the highest consequence to connect the furthest navigable point of the river with the network of roads in the West Coast Government, and to ensure safety of intercourse on the river by some measures of wholesome severity.

Thus prudently and gradually advancing, the Dutch might bring the whole of Central Sumatra under their allegiance, and add to their dominions a new and beautiful Residency, which would soon rival Palembang in importance.

The following remarks were made after the reading of the foregoing paper :—

His Excellency Count VAN BYLANDT (Netherlands Minister) said it was with great satisfaction and a feeling of pride and gratitude, that he had witnessed the very interesting proceedings of the evening. Professor Veth had brought the subject of the exploration of Sumatra before them in such a detailed manner that very little was left for him (Count Van Bylandt) to say. His feeling of pride, however, was due to the acknowledgment by this great scientific Society of the labours of his countrymen in opening up the unknown parts of Sumatra to the inquirers of science and the progress of civilisation, while his feeling of gratitude was prompted by the great and friendly interest shown not only by the Geographical Society, but by the British public generally, in the labours of his countrymen in that direction. For several years he had endeavoured to promote a more regular interchange of communications between the Geographical Societies of the two countries, because he considered it to be of the greatest importance, at least for his country. It was known to everyone that England was the first colonial power in the world, but it was perhaps less generally known by the public at large that his country claimed to be the second. England and the Netherlands being thus the two principal colonial powers, their interests as such were in many respects the same, and created a happy solidarity between the two nations, which led him to believe that the labours of the Dutch, however modest they might be, formed perhaps a not unimportant link in the long chain of scientific explorations which were carried on in several parts of the world. He considered, therefore, that the Geographical Societies of the two countries were as two hands of the same body, the English Society of course being the right hand, but the moral encouragement which had been shown to the Netherlands Society that evening would prompt the left hand to endeavour not to remain very far behind. His friend, Mr. Markham, who now and then paid a short visit to Holland, would agree with him when he spoke of the friendly feelings which existed between the Geographical Societies of the two countries. A new proof of that had been lately given by the fact that the President of the Netherlands Geographical Society, Professor Veth, had had the honour bestowed upon him of being elected corresponding member of the Geographical Society of London, an honour which he could assure the Meeting was very highly valued, and he hoped that the presence in this country of Mr. Bicker-Caarten, as agent of the Netherlands Geographical Society, would also tend to facilitate in future the interchange of communications between the two Societies.

Mr. A. R. WALLACE said the paper which had been read gave but a very brief account of one of the most interesting expeditions that had taken place in recent years in the Eastern Archipelago. He had no doubt that when it came to be published, it would form a work of intense interest to everyone who wished to have a knowledge of that wonderful part of the world, and he only hoped that some arrangement would be made by which the account of the expedition would be published in some other language than Dutch, for that language was almost an unknown one to most Europeans. The island of Sumatra ranked as the fourth in size on the globe. He had the pleasure of visiting it himself in the year 1861, though he spent only two months there, and did not travel about much, because his object was to make

collections, and not geographical explorations. He visited the city of Palembang, and went inland 50 or 60 miles to the south-west of that place, so that he was nearly in the centre of the southern part of the island. He saw a good deal of the character of the country, and as he had also read a good deal about it, he thought it would be better for him to give a brief outline sketch of the general physical geography of the island, than to attempt an account of his own journeys. Sumatra differed considerably from the adjacent islands of Borneo and Java. It resembled Java in possessing a magnificent chain of volcanic mountains, but there was a great difference in the general character of the soil and vegetation. It was not so universally luxuriant as Java and Borneo. Large portions of it were covered with open, grassy plains, and over a great part of the lower lands the soil was by no means fertile. Still, it did not require a fertile soil to produce a magnificent forest vegetation, and Sumatra possessed most glorious virgin forests. All the north-eastern part was to a great extent an alluvial formation, and from the coast to 20 or 30 miles further inland than Palembang, the country, in the rainy season, was to a great extent turned into a lake, though here and there little patches, just sufficient for villages to be built upon them, rose permanently above the water; the consequence was, it was impossible to travel far without boats. But beyond that distance the ground rose slowly and gradually, till it became slightly undulating, cut by the numerous streams into little valleys. The rise was so gradual that at the point he himself reached there was no sign of a mountain, the land being a slightly undulating plain, half forest and half open tracts dotted about with villages, and with little ravines penetrating in every direction. He heard that further inland the country became hilly, and at last there was a magnificent range of volcanic mountains. It was known that extensive coal-fields existed there, but from what he knew of the general structure of the country and of similar coal-fields in Borneo, he could venture to predict that the coal found in Sumatra would not be such ancient coal as that which was used in this country and in the greater part of Europe, but recent or Tertiary coal.*

From the general character of the distribution of the mountains, and the rivers, all flowing to the north-east, a very tolerable idea could be formed of the past physical history of the country. It was quite evident that the grand range of volcanic mountains was comparatively recent, and that the great bulk of the level portion of the island had been produced by the wearing away of the mountains and by the matter poured out by the volcanoes being carried down by the rivers into a shallow sea. Therefore, probably a few hundred thousand years ago Sumatra was very much smaller than at present, consisting of a great chain of mountains with a comparatively narrow border of land on each side. A very curious point in natural history showed that such was the case. The island of Banka was a totally distinct island from Sumatra, being granite, and was never joined to Sumatra, a wide arm of the sea having existed between the two. This was shown by the fact that in Banka there were animals, birds, and insects quite distinct from those of Sumatra. The fact had been ascertained by one of the Dutch residents in Banka, and instead of being a piece

* Since making this observation I have met with a paper (in the 'Geological Magazine,' 1877), on the Geology of Sumatra, by M. R. D. M. Verbeek, the Director of the Geological Survey of the West Coast of Sumatra, in which it is stated that the Ombilin coal-field of the Padang Highlands consists of sandstones nearly 1000 feet thick, without recognisable organic remains, but resting unconformably on a marl-shale formation which is considered to be of Eocene age or intermediate between the Eocene and Cretaceous formations. The coal of Sumatra will therefore belong to the Tertiary period; and as it now forms the summits of high mountains on the central plateau, it affords an indication of the comparatively modern origin of the great mountain range of the island.

of Sumatra, this small island was really a piece of Malacca, having the same geological structure, and there could be no doubt that it was once joined to the peninsula of Malacca. Before the volcanoes originated, however, Sumatra must also have been joined to Malacca, the continent of Asia being extended so as to include Sumatra and the small islands beyond. The row of islands on the west coast also contained some peculiar animals, and were connected with Sumatra by a shallow sea, whereas immediately outside them the sea sank suddenly to the enormous depths of the Indian Ocean; and the wonderful similarity on the whole of the animals of Sumatra with those of the Malay Peninsula rendered it perfectly certain that the two countries were at one time joined, and at a not very remote period. Still it was remote enough for the intervening land to have sunk down, and then for the volcanoes to have arisen and poured such a mass of matter into the water as to form the enormous expanse of undulating country, which was largely formed of a red clayey substance such as was seen in almost all regions where volcanoes abound. It had been deposited in the sea, then uplifted, and then cut through by the rivers.

As the mountains were approached, the variety and beauty of the vegetation increased, and all the more remarkable birds and insects were found there, as well as the higher races of Malays. The whole of the southern portion of Sumatra was inhabited by a genuine Malay race; in fact, they were the originals of the Malays, speaking various dialects of the Malay language. Further north there were other races, which, though belonging to the Malay type, were not of the true Malay stock, and spoke different languages. No doubt, all these matters would be clearly explained in the work which Professor Veth had promised, and of which he supposed that the beautiful photographs now exhibited would form the illustrations.

Notes on the Cocos or Keeling Islands. By HENRY O. FORBES, F.Z.S.

Map, p. 816.

I LEFT England in October 1878 for the purpose of investigating the fauna and flora of certain districts of the Malay Archipelago. Arriving in Java in the middle of November, the rains set in in such good earnest that I was beginning to fear that I should be detained in a state of almost complete inactivity till the season was more advanced, when I was informed that a small trading brig belonging to the proprietor of the Keeling Islands, was lying in the roads on the point of sailing. I at once decided to pay a visit to this outlying spot, made classic by the visit of Mr. Darwin in the *Beagle*, and by his description of the atoll in his 'Coral Reefs,' to see what changes, if any, had occurred since 1836. Embarking on the 17th of December, 1878, I arrived, after a passage rendered dismally long by continual calms and contrary winds, on the 16th of January of this year. I was received by the present governor, George Clunies-Ross, Esq., with the greatest kindness. To him I am indebted for a vast deal of accurate information regarding the islands. He is a keen observer, and thoroughly acquainted with the manners and habits of every living thing, animal and vegetable, within his domains, as I had very frequent opportunities of verifying. The history of the island for the last twenty years, during the greater part of which it has been under the present direction, would form a most

interesting chapter in the history of colonisation. It is too long to enter into here, and must be left for a future occasion; meanwhile I shall confine myself to the observations I have made on its scientific aspects, and in noting these I have followed the narrative of Mr. Darwin in his 'Coral Reefs,' edition of 1874.

When the *Beagle* visited the South Keelings in 1836, both Captain Ross (R.N.) their discoverer (for as far as I can learn they were unknown till he, on his homeward voyage from Java after the rehoisting of the Netherlands flag in Batavia sighted and landed on them), and certainly their first occupier, as well as his son were absent; a circumstance greatly regretted by them on their return, the more so when they learned that Mr. Darwin had had to rely on the person left in charge of the settlement for some of his information. It will be seen below that this information was not altogether reliable.

The weather during my visit was not sufficiently favourable to enable me to examine the state of the outer margin, save on one occasion, and that only on the eastern shore of Direction Island. The margin was paved with huge pieces of natural concrete, made up of pieces of worn coral, and shells, not always broken, imbedded in a solid calcareous matrix; whereon was spread out a mass of rough shingle extending close to the foot of the bank, as it were, on which the trees are growing, and in breadth about five or six yards. Of this *loose* shingle or *débris* the whole island is composed; thus differing from all the others in possessing in its centre no *concrete floor*, wherever excavations have been made; and, as might be expected, this is the only island in which there is no fresh water, perhaps an indication that this particular islet is not so old as the others. I observed numerous mollusca boring in the hard barrier concrete on the southern edge of the island, in particular a species of *Trochus*, which had excavated deep pits over large tracts, especially over spots where a teredo had apparently made its canal, as if in pursuit of this borer. It was with much interest also that on one occasion I observed, as the tide was rising, and just where the surf breaks on the reef, hundreds of large *Scarus* feeding off the coral fields; their cushioned heads pressed hard against the rock while they gnawed away the polyps with their powerful naked teeth.

Between Direction Island and the small spot next to it set down on the Admiralty Chart as *Workhouse Island*, there were indications of what appeared to me to be recent elevation. At the northern end of the latter island, it being then ebb tide, we walked over a portion of the margin on which was standing only an inch or two of quite warm water; here I observed Ostræidæ, small Chamidæ, and other shells, all dead *in situ*, doubtless killed by exposure to the sun and fresh water with which they would inevitably be flooded during heavy rains. At high tide they would be some depth under water. These shells did not present the same corroded and blackened appearance which others in the

lagoon did, and which were destroyed by a cause to which I shall presently refer; yet there is a *possibility* that the destructive agency was the same. This island has a high beach completely surrounding it of very fine white sand, composed almost entirely of the minute shells, nearly microscopic, but of exceeding beauty, of mollusca, of echini, and of crabs, with a small proportion of coral débris; quite different from the sand I saw anywhere else on the atoll.

In the lagoon I have to note that the channel referred to by Mr. Darwin, through which a vessel built on South East Islet was floated, is now entirely filled up, no trace being perceptible, as well as the "boat passage," dotted out on the Admiralty Chart, from the south-east extremity of Long Island, as is also the "small boat channel" from the old settlement.

I have had an opportunity of examining the original chart of these islands, made by Captain Ross, when he surveyed the group shortly after its discovery, in 1825, and there I can find no indication of South East Island having been divided by channels into islets, as stated by Mr. Darwin. There is scarcely any perceptible difference in the external configuration of the various islets. The soundings in the lagoon, however, show a greater continuous depth, and I am told that the *Borneo* sailed, on her first coming, far up the bay, and anchored where now no ships can nearly approach. The coco palms all along the margins of the islands are smaller than those in the interior, though in many cases they are much older, and Mr. Ross tells me that the rich soil of the interior, with a better supply of fresh water, and where the sun does not strike so strongly, is favourable to the production of larger and taller stems (some reach a length of 118 to 120 feet), while the amount of fruit is not more than from the shore-growing trees.

I was not able to satisfy myself as to what part of the lagoon Mr. Darwin refers when he says "the upper and south-eastern part." I did not see the dead field of coral mentioned at page 21 of his 'Reefs.' The explanation given by him does not seem to be well founded, viz. that since the closing of the above-mentioned channels, the water would not rise so high in the lagoon as before, and that the corals, which had attained the utmost possible limit of upward growth, would be occasionally exposed for a short time to the sun and be killed. Such a circumstance, however, as I describe below would be a sufficient explanation. I put the question to the present proprietor, if there was any difference in the rise and fall of the tide in the lagoon, and received the reply that as far as he had observed for the last twenty-five years there was no diminution of the rise at the head of the lagoon during a high south-east wind, compared with that at the mouth.

I observed numerous trees undermined by the water both inside and outside the lagoon, some bending down close to the sea, others quite prostrate. Mr. Ross assured me that this really indicated no sign of

encroachment on the land, as all along the margins of the islets, spots here and there, according to the direction of the gales, are worked into by the tide, but the débris is carried a little further along, and redeposited to the same amount; and what this year has been removed will at a future day be replaced at the expense of some adjacent spot. This I could see in the case of the small island already referred to—Work-house Island on the chart—which suffered severely during a cyclone in 1876, and of which one corner had been completely washed away, along with the trees growing on it, but now to a great extent replaced. It seemed to be the same all round the island, where the coco-nut trees grow to within a few feet of high-water mark. In regard to the “foundation posts of a shed now washed by every tide, but which the inhabitants stated had seven years before stood above high-water mark,”* Mr. Darwin seems to have been wrongly informed. These posts never belonged to any building, but were driven in by Captain Ross, in order at that point to make an artificial jetty or breakwater, which at the period of the *Beagle's* visit was uncompleted. It was subsequently finished, and now protects the landing-place from the current entering by the southern end, which otherwise would sweep round and deposit sediment in the baylet where the settlement stands.

In the year 1863 there occurred a cyclone which devastated the islands, sweeping down the coco-nut trees, and ruining all the houses. During its height the wind, which came in gusts, “could, as is described by all those who witnessed it, “be seen, as a thick mist, or broad belt of steam,” to whose violence everything yielded—trees, shrubs, grass! When the hurricane had passed, scarcely one green blade was to be found on any islet of the group. Following the tempest there was a period of drought extending over seven months, so severe that the trees which survived had not recovered the shock within ten years. To crown the disaster, myriads of locusts, which suddenly appeared, doubtless brought by the wind, devoured for a time every leaf as it came forth.

In 1866 there were many months of rain, so heavy that the fresh water stood several inches on the surface of the lagoon, causing the death of large numbers of fish.

The islands by degrees recovered the disaster of 1863, and the crop of nuts had again almost reached an average weekly rate as great as that before it (by this time, however, the whole of the islands had been cleared of brush, and were producing nuts). On the 25th of January, 1876, the mercurial barometer indicated some unusual atmospheric disturbance; the centre of the mercury became depressed into a deep hollow tube, without falling much, while the air felt extremely heavy and oppressive. The mercury remained stationary till the 28th, when it fell to a little above 28 inches. This timely warning gave opportunity for all boats to be

* ‘Coral Reefs,’ page 24, 1871 ed.

hauled up and doubly moored in a place of safety. In the forenoon of this day, the 28th, there appeared in the western sky an ominously dark bank of clouds; at 4 P.M. a cyclone of unwonted fury burst over this part of the Indian Ocean, commencing in the south-west and travelling round to the east.

The store-houses, engine-room, and mills, all built of stone, were completely gutted, and partially demolished; their squares of corrugated iron roofing were carried to distances of four and five miles, where they were afterwards recovered. One square I saw immovably imbedded in the trunk of a large tree. Every house in both villages was entirely destroyed. Among the palms, both on North and South Keelings, the wind seems to have played a frantic and capricious devil's dance, clearing long lanes, yards and sometimes miles in length, snapping the trees close to the ground; sometimes cutting out circular spots, many yards in diameter, without injuring the trees on the circumference or making an entrance or exit path; sometimes it has made long ovals, leaving unharmed the trees in the interior; not seldom it has twisted the stems in a locality, some of them of thirty years' growth, into perfect screws, without uprooting or in other ways damaging them. Everywhere the prevailing force seems to have been rotatory. The storm reached its height about one o'clock on the morning of the 29th, when everyone again avers that he could distinctly see the gusts of wind, condensed into steam, as it were, cutting asunder and demolishing, as it travelled, every opposing thing. To what distance the barometers fell it is impossible to tell, for the mercurial was broken, and the aneroids when once they had fallen below $27\frac{1}{2}$ inches suddenly ceased to register, and to this day stand mute witnesses of the strain they endured. In the former eyelone, also, the aneroids gave way at the height of the storm. About midnight of the 28th, when intense darkness would have prevailed, save for the incessant blaze of lightning, whose accompanying thunder was drowned by the roar of the tempest, when all were endeavouring to save as much rice—the only food left to them—as possible, Mr. Ross discovered to his horror the bowsprit of the schooner, which was lying at anchor some distance off, riding on the top of a great wave straight for the wall behind which they stood. There was only time to make themselves fast before the water washed over them, fortunately insufficient to carry the vessel through the wall! A second wave washed completely through Mr. Ross's own house, standing at a distance of about 150 yards from high-water mark. There was at least another similar wave; but whether there were more is uncertain, the occasion being scarcely favourable for accurate observation. The conglomerate round the whole atoll has been scooped under, broken up, and thrown in vast fragments on the beach. On the eastern shore of New Selima or Water Island, just opposite the settlement, I saw a wall of many yards breadth and several feet in height thrown up clean over the

external high rim of the island several yards inwards over a thick hedge of redwood and *moncoodie*, in among the coco-nut trees, and this all along the island's margin.

The following morning broke with the calm and brightness of a summer day, but the sun shone only on stately widowed stems and leafless trees, and on incredible ruin and confusion—still too plainly to be seen. Within the compass of the islands not a speck of green could anywhere be found, not even among the blades of grass or among the fallen and scattered leaves; all were black and withering. Yet in six months every tree and shrub was clothed in green; and now, in three years, all are yielding their full crop again.

About thirty-six hours after the cyclone, the water on the eastern side of the lagoon was observed to be dark-coloured. Examination showed that the point of origin was somewhere about the southern end of New Selima and the northern end of Gooseberry Island, and, moreover, that it was coming up from below. The colour was of an inky hue, and the smell "like that of rotten eggs." From this point it spread south-westward as far as the deep baylet in South-East Island, where, meeting the currents flowing in at the westward and northern entrances, which run, the one round the western, the other round the eastern shores of the lagoon, its westward progress was stopped; whereupon, turning northwards through the middle of the lagoon, it debouched into the ocean by the northern channel, having become slightly less dark as it proceeded.

Within twenty-four hours every fish, coral, and mollusc in the part impregnated with this discolouring substance—almost certainly hydrosulphuric acid—died. So great was the number of fish thrown on the beach, that it took three weeks of hard work to bury them in a vast trench dug in the sand. I am informed that many strange species were found which have not been seen since, nor had they been seen before. There was no time to spare to preserve them; it was feared the stench might breed a pestilence. After about ten to fourteen days the discoloured water ceased to ooze up.

I carefully examined that part of the lagoon over which the poisoned water spread. The day was so calm that I could see the minutest objects on the bottom. The sight was such that I could not resist the peculiar feeling of depression one experiences in passing through a forest over which the fire has passed; for the whole eastern half of the lagoon is one vast field of far-spreading corals, where stand now only blackened and lifeless stems; where once flourished thousands of giant clams and other mollusca, but occupied now by vacant, lustreless shells alone, in all stages of expansion. Everywhere both shells and coral are deeply corroded, the coral especially being in many places worn down to the solid base. For the past three years there has been until lately no sign of life; very few fishes even now are to be found

there; while here and there can be detected a new branch or two of *Madrepora* and *Porites*. I found only one *chama* alive, whose length was 12 and its breadth 13 inches.

Beyond the line of the dark water the coral is growing with great rapidity; but in thick clumps between which there are pits, of no great diameter, but extending to a depth of some eight or ten fathoms. Why it should grow thus it seems difficult to understand; and why in these pits the coral should be almost confined to a species growing in "three foliaceous fungus-like expansions covered with stars."

That an earthquake should have occurred on this reef two years before the visit of the *Beagle*, is an interesting fact. That an earthquake took place in 1876, I think can scarcely be doubted, although no tremor was detected by anyone on the island—scarcely to be wondered at during the war of the elements, and the crash of falling houses and trees. The tidal waves as well as the darkened water (issuing, without doubt, from some subaqueous rent in the earth) indicate the occurrence of an earthquake. The explanation, therefore, of the dead field of coral observed by Mr. Darwin may lie in the supposition that some such phenomenon accompanied the earthquake of 1834.

In the small boat channel close to the settlement—where the coral has begun again to grow vigorously since 1876—the water at this spot was not so deeply impregnated with poison. I obtained several living bunches, easily dislodged by the root from the chalky bottom on which they grew, by the hand, without the aid of a crowbar. I found their average diameter across the top to be 12 inches, and their height from the centre to the top of the branches $6\frac{1}{2}$ inches. As this channel was thoroughly cleaned out down to the white mud on the 20th May, 1878, and as my measurements were made on the 30th January of this year, the age of these bunches was under eight months and ten days.

There is scarcely any perceptible increase in the length of the islands. On the eastern side there is some increase in breadth against the direction of the prevailing winds. Between Turtle Island (at the southern bay of Long or West Island) and the point opposite to it, the coral has grown up so that one can almost step across from one to the other; while a few yards northward there has been deposited within the last ten years, close to where the now obliterated boat channel began, a sandbank jutting out in a south-westerly direction. By and by there will be formed a second smaller lagoon, similar to the one a little to the northward.

The small islands between West and South-East Islands have each received slight additions on their northern aspects. On the western side, where the chart shows "channel," there is now no passage. A large sandbank has accumulated inside the lagoon. The long northern promontory of West Island has to some extent been worn away by the current sweeping round that point into the lagoon, and redeposited as

a long bank on its eastern shore; some of it is also carried as far southward as the elbow opposite the top of the small lagoon, while some has been redeposited at the entrance. This little lagoon is becoming every year more and more shallow; at ordinary tides a small portion only is covered, while the whole space is never submerged except by the extraordinary tides occurring twice a year. Portions of the northernmost end are already reclaimed; coco-nuts are now fast taking root in the shallower parts, while the wonderfully adapted worm-substitute, the pomegranate crab (called by the natives Kapitang Dulima), with a greyish-white carapace, and an enormously developed, bright pink-coloured right-hand claw, is assiduously labouring to make the soft, pure-white calcareous mud, composed of fine coral detritus and their own cast-off claws and chelæ, into tree-inhabitable land. The whole of the little lagoon, over a mile in length and three-quarters in breadth, is crowded with the holes of this small crustacean; a spot selected at random, measuring two square feet, contained more than 120 holes, each about from half to an eighth of an inch in diameter. Each hole is surmounted on the top by a small rim of mud just like the earthworm's at home, and reaches to a perpendicular depth of between two and three feet, but in a spiral manner. It was a most interesting sight to watch these busy pioneers of cultivation carrying down fucus and sea grass, scraps of coco-nut palm leaves, fibres of coir, and fragments of nuts as well as considerable branches, which, by scooping the soil from underneath them, they gradually bury completely out of sight. Being exceedingly timid, they are very difficult to catch. On the slightest sound there is a general retreat to their holes for safety; the only portions exposed being the eyes at the end of long eye-stalks and part of the pink chela. As the footstep approaches, one's eye is conscious of a quick jerky movement about the mouth of the hole, and of the disappearance of areas of pink spots. To dig out the occupant, following its spiral stair-way, entails the excavation of several feet of tenacious pasty clay. From Horsburgh Island a spit of sand runs out in a direction more north-westerly than is laid down in the Admiralty chart, to meet another in a south-westerly direction from North Keeling, on which, at a spot half-way, the bottom can be seen in calm weather. Lastly, it is possible to walk at low tide, with some slight wading, all the way from Direction Island to West Island.

The climate is temperate and extremely healthy; the average of the thermometer for the three weeks of my residence is the following:—Lowest in night $76^{\circ} \cdot 12$ Fahr., 8 A.M. $81^{\circ} \cdot 59$; highest $83^{\circ} \cdot 7$, 8 P.M. $80^{\circ} \cdot 51$. The barometer was almost stationary at sea-level pressure.

The inhabitants, all of Malay origin, are well developed, strong, and of a wonderfully healthy appearance; the average height of fourteen selected at random was 5 feet 7·27 inches, and their weight 160·72 lbs.

I trust that these notes, rough and written in the hurry of travel, may not be without some interest.

Boundary-line of Chili and Bolivia.

Map, p. 816.

As the causes of the present war between Chili and the allied Republics of Bolivia and Peru involve a question of geographical boundaries, and appear to be little known to the British public, the following statement, illustrated by a map of the disputed area, may be of service to our readers.

On the political emancipation of Spanish South America, the principle adopted by the new Republics for the determination of their respective boundaries was, that they should be identical with the limits of the several original colonies, the boundaries of which, while they were subject to one and the same home authority, were naturally somewhat elastic and ill-defined. No question, however, seems to have arisen between Chili and Bolivia on this point until the discovery in Europe of the value of the guano found on the coasts of Peru, when Chili, in 1842, was induced to send an exploring commission for the purpose of ascertaining the existence of any similar deposits in its territory, which was at that time assumed to include the coast lying between Coquimbo and the Bay of Mejillones. The result having shown the existence of guano in various places as far north as $23^{\circ} 6'$ S. lat., Bolivia was not slow in putting forth her claims to the coast and desert of Atacama, including these discoveries, as being within her territory; and on the subsequent investigation of national titles, she even went so far as to claim the mouth of the Salado ($26^{\circ} 20'$) as her southern coast limit. Evidence, however, was adduced on the other side to show that Chilian jurisdiction had been exercised up to 23° south latitude, and an arrangement was finally arrived at in August 1866, the boundary being fixed by treaty at the 24th parallel of south latitude, from the shore of the Pacific to the eastern limit of Chili, with an equal division between Bolivia and Chili of revenues from all guano deposits and exports of ores extracted in the territory between the 23rd and 25th parallels, these products being held in common by the two countries, though the territorial limit was definitely fixed as above mentioned. Cross powers of appointing inspectors and receivers were granted by this treaty, and in pursuance of it Chili evacuated the territory previously occupied by her north of the 24th parallel.

In 1870, fresh discoveries of mineral riches between the 23rd and 24th parallels were made, of far greater value than the original deposits of guano, resulting in the rise of the towns of Antofagasta, and Placilla in the Caracoles, but a division of revenues was, according to Chilian accounts, evaded by Bolivia under different pretexts. After much negotiation, and the signing of an agreement for adjustment in 1872, a final treaty was signed in August 1874, cancelling the treaty of 1866, and abandoning on the part of Chili all her share in the revenues

arising between the 23rd and 24th parallels, with their accompanying powers, in return for the exemption of Chilian subjects from imposts on material extracted between the 23rd and 25th parallels, higher than those then in force. The failure of compliance by Bolivia with this latter condition appears to be the immediate cause of war, hastened by a decree confiscating Chilian property at Antofagasta. The reasons that impelled Peru to espouse the cause of Bolivia are purely political.

It can scarcely be doubted that the origin of this war is connected with the unexpected development of mineral wealth in this small portion of territory intervening between Peru and Chili. Apparently barren and unproductive in the extreme, the whole province of Atacama is one vast mine, containing gold, silver, saltpetre, iron, copper, and other valuable products. Of these, the silver at Caracoles and the saline deposits available as fertilising agents are the most valuable. Upwards of 4000 silver-mines are stated to have been discovered, surveyed, and assessed in the first district of Caracoles alone, from which exports of bar silver to the value of 75,000*l.* were made in one year, soon after the discovery of the mines and under disadvantageous circumstances. Now there are two railways, one from Antofagasta, on the coast, reaching a point some 30 miles from the mines, and another inland from Mejillones. The formation of the mine-range is Jurassic, with porphyry, the principal veins having porphyry on one side and limestone on the other, the number of ammonites contained in it giving the name to the mountains ("caracol" meaning a spiral).

The deposits of nitrate of soda and potash occur near Antofagasta, at Las Salinas (reached by the rail), and in the Desert of Atacama. They are both found on the hill-sides, thinly coated with sand, apparently on the margins of ancient lakes; in plains, following the hollows, being then probably washed down by rains and recrystallised; and also in valleys, under a coating of common salt. The evaporation that caused the deposits can be readily conceived from the account given by Mr. J. Harding (to whom we are indebted originally for the map accompanying these notes; see 'R. G. S. Journal,' xlvii. p. 252) of the local dryness of atmosphere; this gentleman found at Salinas that a thick sheet of notepaper, if folded and pressed, would break in two on being reopened.

GEOGRAPHICAL NOTES.

Discovery of the Source of the Niger.—We learn from a French newspaper that information has reached Marseilles of a successful journey to the sources of the Niger, made by two *employés* in the commercial house of M. Verminck of Sierra Leone. The expedition, it appears, originated with M. Verminck himself, who sent forth two of his clerks, MM. Zweifel and Moustier, with an equipment of surveying instruments, maps, and goods, for the express purpose of reaching the

spot on the northern side of the Kong Mountains, some 200 miles from Sierra Leone, where both Major Laing, in 1822, and Winwood Reade, in 1869, were informed by the natives lay the sources of the "Joliba." The two envoys ascended the River Rokelle to the foot of the mountains, and seem to have met with none of that opposition from the chief of the important town of Falaba, which defeated the attempts both of Laing and Reade to reach the sources. The crossing of the mountains appears, however, to have been a difficult undertaking, not accomplished without much determination, aided by good luck. The main source was found on the frontier of Kissi and Koranka; in short, near the place indicated on Major Laing's map. Details of this Geographical achievement will be anxiously looked for.

Exploration of the Binue Branch of the River Niger.—The Church Missionary Society's steamer, *Henry Venn*, has left Lokoja, at the confluence of the two branches of the Niger, to ascend the Binue branch, up which no vessel has been for any considerable distance since the visit of Dr. Baikie and Mr. (now Bishop) Crowther in 1854, when in search of Dr. Barth. The present Expedition has been for a long time in contemplation, it having been alluded to by Mr. E. Hutchinson at our meeting of June 11th, 1877.* The steamer took up the Society's two English agents, Messrs. Ashcroft and Kirk, but Bishop Crowther, who takes a great interest in the thorough exploration of the upper course of the Binue, and believes it to be an important link in the chain of water communication across the continent, was unfortunately detained at Lagos by the illness of Mrs. Crowther.

M. Soleillet.—It is announced that M. Soleillet will leave Bordeaux on December 20th for Senegal, to undertake the new Expedition to the Niger referred to on p. 512. In addition to the assistance promised him by the Senegal Government, M. Soleillet will receive aid from the committee appointed last summer to examine into the details of the proposed Trans-Sahara Railway, and the field of his explorations will lie between 15° and 27° N. lat.

Belgian International Expeditions to Central Africa.—The last mail from Zanzibar brought the news that the first of these expeditions, under M. Cambier, had at length reached Lake Tanganyika. The elephants accompanying the second expedition were passing through Ugogo in September, and were pronounced on all hands to be a great success. They had proved themselves capable of travelling great distances with loads, enduring continued fatigue, and existing on one occasion, while at work, for two days without food or water. It was considered that the two doubtful points, viz. whether they were proof against the tsetse fly, and were capable of working in an African climate on native food alone, had been settled in their favour. One of the animals had died from the effects of accidental illness.

* 'Proceedings,' vol. xxii. p. 496.

The London Missionary Society's second Expedition to Lake Tanganyika.—After consultation with Dr. Baxter, of the Church Missionary Society's station at Mpwapwa, Messrs. Southon and Griffith, on the death of Dr. Mulleus, resolved to follow a new route through Ugogo, which Dr. Baxter had recently explored, and which, diverging to the north a little beyond Chunya, six miles from Mpwapwa, runs in a straight line to Uyui. They accordingly left Mpwapwa on July 21st, in company with a large Wanyamwezi caravan, which was going through Uyui. Nukombe was the first halting-place, four miles north of Chunya; the party were then occupied for nearly two days in crossing the Marenga Mkali in a north-westerly direction. Passing Mahamba and Masanga, they travelled 20 miles W.N.W. to Njassa; then striking due west, by way of Kitunda and Hirindi, they reached Kiganza, a distance of 47 miles. After spending two or three days here, the Expedition moved on to Lagula, 10 miles further, from which place Dr. Southon wrote on August 6th. Though we have no details of their journey beyond this place, we learn that the party duly arrived at Mirambo's capital, where, thanks to a letter from Dr. Kirk, they were well received. Mirambo invited them to form a station in his country, and voluntarily gave up the goods belonging to the London Missionary Society, which he had taken possession of when they were in charge of M. Broyon. Speaking in his letter of the country traversed as far as Lagula, Dr. Southon says that, for the most part, it resembles South Ugogo, but with long stretches of wooded and beautiful country, as, for instance, between Masanga and Hirindi. Generally the route lay between ranges of hills, running east and west for the latter part of the journey, and N.N.W. and S.S.E. in the earlier stages. The people are of a much better character than those on the Mvumi and Kididimo road, and lack the bold, audacious manner, so often described as belonging to the Wagogo. They appear to be a simple, pastoral race, and in no way aggressive; they are curious and credulous in the extreme, and very superstitious; many of them have intellectual, and even classical-looking, faces; some of the men are really handsome in figure, while the women are frequently pretty and intelligent. The young men make a great show of immense spears, bows, and arrows, but the older men simply carry a long stick; and the entire absence of wound-scars, which Dr. Southon looked for in vain, confirmed him in his opinion that they are not an aggressive people. Ornaments in great variety are worn, some of which are described as not inelegant, and all display a large amount of mechanical ingenuity. It may be added that Dr. Baxter only travelled half the distance from Mpwapwa to Lagula, and therefore that the country and people referred to by Dr. Southon have never before been visited by Europeans.

The Tribes of East Africa between the Coast and Mpwapwa.—Mr. J. T. Last, of the Church Missionary Society's station at Mpwapwa, has recently sent home a comparative vocabulary of the dialects spoken

along the road to Mpwapwa, together with a short account of the tribes using them, and their relative geographical positions. From his detailed account published in the 'Church Missionary Intelligencer,' we glean the following :—The tribes met with, in travelling inland from the coast, are the Swahili, Waseguhha, Wanguru, Wakamba, Wakwafi, Wakaguru, and Wagogo. After the coast country inhabited by Swahili is passed, the Waseguhha tribe is met with. They inhabit a large district which extends from the Pangani River on the north nearly to Bagamoyo, and from Mkange, the second station from the coast, to Kidudwe, at the foot of the Nguru Hills, a distance of about 100 miles. The people are agriculturists, and do not often engage in the chase, though the western side of their country is well stocked with game. They are hospitable and good-natured, as well as industrious and clever at some handicrafts. The next tribe is the Wanguru, through the southern limits of whose country the road from Saadani runs. They are a scattered people, and great numbers of them live among the mountains north of Kwa Masengo, where they cultivate the ground on a large scale. They grow tobacco extensively, and three native medicines peculiar to themselves—*Udaha*, *Mkunya*, and *Kwemi*; the first of these is the seed-pod of the *Mdaha*, which when ground is very hot to the palate; and the other two are vegetable fats produced from seeds. Besides the Wanguru living in the region just mentioned, a great number of the same tribe are found about 20 miles north of Mpwapwa. Mr. Last made inquiries about the people of the large district called Unguru in Speke and Grant's map, to the south of Unyanyembe, and inclines to the belief that these people belong to the same stock, the Wanguru being of wandering habits, which are characteristic of all the tribes of Wanyamwezi origin. These Wanguru are not so fine a tribe as the Waseguhha, and have generally shown themselves very timid. Mr. Last next speaks of a tribe, in which Dr. Krapf took a great interest—the Wakamba. These people have left Ukambani and settled in three small villages near Mkundi among the Wanguru, their chief object in so doing being to obtain a good hunting-ground. On the west of Mkundi is a large forest and wilderness extending a considerable distance to the north, and to Magubika on the west, and bounded on the south by the River Wami. This forest is well stocked with large game, among which are the giraffe and a great variety of antelopes. The Wakamba settle down near Mkundi, and cultivate the ground for food, remaining only until they have got a good stock of ivory and teeth by hunting, when they return home. The next tribe are the Wakwafi, or, as they are generally called, the Wahumba. They are natives of Uhumba, a district lying to the north of Ugogo, but left their homes, being oppressed by the Masai, and settled down at Kitange and Lebehu, four and three days' march respectively east of Mpwapwa. Dr. Krapf compiled a vocabulary of their language, i. e. Ki-kwafi, and when Mr. Last compared it with his

own, he found that the difference between the two was small, lying chiefly in the mode of spelling. The country where these Wakwafi are settled is also inhabited by the Wakaguru, whose country extends a distance of about 80 miles, while on the north it is bounded by a great plain, which separates it from the Masai country, and on the south it reaches to Usagara. The Wakaguru appear to be unwilling to place confidence quickly in strangers; they are described as dull, and in some cases quite childish. Their chief district is Mamboia, a large plain, from which there is no egress except through the defiles of the mountains, by which it is surrounded; it is believed to be a very healthy place, with plenty of good land and abundance of water.

Lake Nyassa.—The Free Church of Scotland have received a letter, dated Livingstonia, July 9th, from Mr. James Stewart, c.e., then in charge of the Nyassa mission. He reports having been northward to visit the stations at Marenga and Kaningina. The Marengoni chiefs had presented the mission with some cattle, but insisted on their being used only in the country round Kaningina. Mr. Stewart notes that at Livingstonia advancing cultivation had driven off the pestilent and fatal tsetse fly. In a letter, dated Quillimane, July 28th, the Rev. Dr. Laws, who was on his way back to Livingstonia, mentions a report that the Portuguese Government contemplate the construction of a road from Quillimane to Lake Nyassa.—We learn from another source that Mr. Stewart has since made a journey across the country intervening between Lakes Nyassa and Tanganyika.

The late Mr. Frank Oates' Researches in Matabele-land. — The notes of his journey in the interior of South Africa made by the late Mr. Frank Oates, F.R.G.S., whose death was noticed in Sir Henry Rawlinson's Address to the Society, in May 1875, have recently been prepared for publication under the editorship of one of his brothers, and are likely to appear in the course of a few weeks. Mr. Oates left England in March 1873, and landing at Durban the following May, proceeded direct to the Matabele country, where he continued wandering till the date of his decease, on February 5th, 1875. The object of his journey was in a great measure the collection of natural history specimens, and the results of his researches in this direction will be treated of at some length in the forthcoming volume by various authorities, each on his respective subject.* He also paid attention to the physical conformation of the country, and to the customs of its inhabitants, whose character he had ample opportunities of studying. He spent several weeks at Gubu-

* A paper on the birds which Mr. Oates collected has been contributed by Mr. R. Bowdler Sharpe, M.A., and one on the insects by Mr. J. O. Westwood, Hope Professor of Zoology in the University of Oxford. Dr. Rolleston, Linacre Professor of Anatomy and Physiology at Oxford, further contributes an article on the Bushman races of South Africa generally, and of this district in particular, some remains of a party of murdered Bushmen having been collected for him in Matabele-land by the late traveller.

luwayo, the chief residence of the Matabele king, Lobengule, and there witnessed the grand ceremony of the great dance, when the tribes assemble together from all parts of the kingdom, to celebrate the feast of the first-fruits of the season. The traveller's furthest point to the eastward was the Umgumye River (a little beyond the Gwailo), in which direction he obtained elephant, and a variety of other game. After this, returning to the Tati, whence the Zambesi can be reached nearly the whole way by waggon, considerable opposition was offered to his progress by the Makalakas, a race subject to the Matabele, through whose district he had to pass; and this in spite of his having obtained permission from the king to visit the Victoria Falls. The delays thus occasioned unfortunately threw his visit to the river in the unhealthy season of the year. He reached the Falls on the 31st of December, 1874, and died of fever on his way back, a short distance north of the Tati settlement. His collection and effects were kindly taken down to Shoshong by Dr. Bradshaw, an Englishman whom he had fortunately met near the Zambesi, and who was with him at the time of his decease, and thence conveyed to England by a personal friend who went up country for the purpose. His long sojourn amongst the Matabele enabled him to become intimately acquainted with their customs and social organisation. The king, Lobengule, was still, while he was there, constantly sending out marauding parties, to bring into subjection the outlying portions of the Mashona and Makalaka communities, not all of whom, at that time at all events, acknowledged his supremacy. Nations like these, with no recognised head, themselves split up into various petty tribes, stand absolutely no chance whatever against a well-organised body of disciplined troops like the Matabele, and they are easily subdued. The old people are killed and the young ones taken into slavery. In some instances, indeed, Lobengule allows the conquered people to live on in their own kraals with a Matabele headman placed over them; but these headmen themselves have by no means always an enviable or easy time of it, and hold their office on an insecure tenure. Several of these, during Mr. Oates's stay in the country, were executed on suspicion of a desire on their parts to encroach too far on the despotic authority of Lobengule. The Bushmen, who are the aborigines of the country, and here—unlike the allied race in the Cape Colony—a fine, well-made people, are merely looked upon as game, and are constantly being hunted down and killed. In spite of the difficulty Mr. Oates encountered of reaching the Zambesi through Lobengule's territory, he derived the impression that the king was glad to have a few white men in his country, to enable him to trade. He greatly objected, however, to the proceedings of the Dutch Boers, who only came to collect skins and thus waste a vast quantity of meat. The scenery for the most part throughout the whole district is dull and monotonous, but in some instances—and notably on the Inkvesi and Semokie rivers—there are exceptions to this rule; the

country, in such cases, being picturesquely broken with low, rugged hills or "kopjes," the ground strewn with huge masses of stone and crags, and the level spaces scattered over with fine trees.

A Geographical Society in Japan.—A Geographical Society has recently been established at Tokio (Yedo) Japan, under the title of the Tokio Geographical Society. His Imperial Highness Kita Shirakawa-no-Miya has been elected its first president.

Professor Nordenskiöld's Reception in Japan.—The Swedish explorer and the officers of the *Vega* were entertained at a banquet on September 15th by the Tokio Geographical Society, the Japan branch of the Asiatic Society, and the German Asiatic Society, the chair being taken by his Imperial Highness Kita Shirakawa-no-Miya, president of the first-named Society. On September 17th Professor Nordenskiöld and his party were received in audience by His Majesty the Mikado, who personally congratulated the chief of the Swedish Expedition on the fact of his having arrived in Japan by a route which had never been traversed before.

Count Széchényi's Expedition to Western China and Tibet.—Since the publication of our November number, news has arrived from Shanghai which makes the Hungarian traveller's movements somewhat more intelligible than the account furnished us by our correspondent in his report of the proceedings of the Geographical Society of Berlin.* We learn from the 'North China Herald' that letters reached Shanghai in the middle of September, from a member of the Expedition, written from Si-ning-fu, near Koko-Nor. The information in these letters is stated not to be very explicit concerning Count Széchényi's movements subsequent to the events mentioned on p. 595, but it seems that from Su-chow-fu, moving southwards, he visited the high range forming the northern boundary of the plains of Tsaidam. Then, retracing his steps to Su-chow-fu, he travelled in a south-easterly direction to Si-ning-fu, crossing an extensive hilly region through the central basin of which the River Tatung flows towards the Yellow River. These mountains, which in some parts attain the limits of perpetual snow, are usually known as the Nan Shan. Si-ning-fu, according to Colonel Prejevalsky, is situated at the foot of lofty, snow-clad mountains, in a well-cultivated country, which is chiefly inhabited by Tangutians and Taldi, and is the principal depôt of the rhubarb trade with China and Russia.—Count Széchényi's next endeavour was to reach Lhassa by the direct route which is sometimes taken by the Lama caravans, and runs from Koko-Nor to the south across the high and desolate plateau of Tibet. He went as far as the plain of Odantala, in which are the sources of the Yellow River, but meeting with many obstacles and being unable to obtain a guide, he was obliged to give up the attempt. The direct route has, therefore, been abandoned,

* *Ante* p. 737.

and the Expedition was to return to Lan-chow-fu, in Kansu, leaving Si-ning-fu on August 10th. The party now propose to travel from Lan-chow-fu to Chêng-tu-fu, the capital of Szechuen, and thence to make their way to Batang, probably by the same route as was taken by Captain Gill. Count Széchényi hoped to reach Lhasa by the middle of November, and Calcutta about the end of the year. During his six weeks' stay at Si-ning-fu he has made several excursions to the Koko-Nor and surrounding country, and it is hoped that he will have obtained much information about the steppes and mountains of that region, and the rare animals which are said to abound there.

Korea.—With the exception of the coast-line, no scientific survey has hitherto been made of any part of Korea, and it is therefore interesting to learn that the Japanese have been availing themselves of a favourable opportunity, afforded by the despatch of a special mission to the Korean court, to survey parts of the country to the south of the capital. The envoy proceeded by sea from Fusan, the ancient Japanese settlement at the south of the peninsula, to the port of Shijin, in the Chusei province. Landing there, he and his suite went by land to the boundary between that and the metropolitan province, Keiki, and spent three weeks there, occupying their time in surveys. They then sailed northward to a port named Jinsen, and landing at the town of Yōka, proceeded to the capital, Hanyang (Séoul). The object of the mission was to arrange for the opening of two new ports to Japanese trade, and it has been settled that these shall be Jinsen, in the province of Keiki, and Gensan, in that of Kankiyo, the former of which is only about 19 miles from the capital. The Japanese surveying officer, Mr. Umidzu, travelled overland from the port of Daion to the capital, from which it is some 45 miles distant, after experiencing considerable opposition from the Korean officials, by whom the road is considered a very important one.*

Telegraphic Communication with Siam.—The kingdom of Siam is to be connected with the telegraphic system of the world, and the line to be adopted has already been determined on. This is due to the perseverance of Captain A. J. Loftus, the Government Surveyor-General, who, after traversing the swamps and jungles, forests and mountains of the fever-haunted peninsula and losing half his party in the work, finally succeeded in completing the mapping and laying out of the route as far as the Kwodeng Range. Orders have been sent to England for further materials, and it is anticipated that Major Davidson, the Government telegraphic engineer, will have no difficulty in vigorously pushing forward the construction of the line. It will start from the King's Palace at Bangkok and run to Paknam on posts. Thence it will be

* The mode of writing the Korean names is that used by a member of the mission in a letter from which the above is abridged, and differs materially from that adopted by Père Dallet in his '*Histoire de l'Église de Corée*' (Paris: Palma, 1874).

continued by cable, crossing the Menam River, and running close under the western shore of Siam as far as the mouth of the Petchuburi River, where the land line will recommence, and proceeding by way of Rathburi and Kauburi, will finally terminate on the upper range of the Kwodeng Mountains, closing in there with the English line from Tavoy and Moulmein.—Besides the above-mentioned survey, it may be mentioned that Captain Loftus has carried out important marine surveying work in Siam. He has produced a set of hydrographical sheets containing the west coast of the Gulf of Siam from Hilly Cape to Lem Chang Pr'a, a distance of upwards of 300 miles, and embracing Singora, Patani, and other anchorages hitherto entirely unsurveyed and indeed unknown. Elaborate notes have been appended to the sheets, explaining how the survey has been carried on, and a large number of views also accompany them. These surveys are being reproduced by order of the Government of India.

The Rainfall of Ceylon.—The elaborate rainfall tables for the island of Ceylon, in 1878, with the averages for nine years made up to include that year, exhibit some rather curious features, of which the change in the relative positions of Colombo and Kandy is not the least remarkable. Colombo is 21 feet above the sea-level, while Kandy is situated among the mountains at an elevation of 1650 feet, and their average rainfall has hitherto been taken to be 80 and 90 inches respectively. A series of abnormal seasons, however, has changed their positions entirely, for the average of nine years' rainfall is now, Colombo 88·81 inches, and Kandy 81·26 inches, or a difference of 7·55 inches in favour of the maritime capital. But there is a more striking example, that of Nuwara Eliya, which is the highest observing station in the island, being at an altitude of 6150 feet. Notwithstanding that its average was raised by a rainfall of 111·38 inches in 1878 to 99·44 inches for the nine years, it does not show quite 11 inches more than Colombo, which is certainly surprising, when the great difference in their altitudes is taken into consideration.

Major Biddulph's Tour in Chitral and Yassin.—In the latter part of last year Major Biddulph explored some little-known tracts in Chitral and Yassin, on the north-west frontier of India, regarding which our previous information was derived solely from the accounts furnished by the late Mr. Hayward and the "Mullah." Major Biddulph's tour was apparently undertaken more for political reasons than anything else, and there is not much precise geographical data derivable therefrom. Still his account, now for the first time made public, in the recently issued "Abstract of Surveys for 1877-78," contains much that is interesting. Major Biddulph followed the route up the Gilgit River, where for about nine miles the valley is exceedingly difficult and narrow, until it opens out about Roshan; up the Wurshigum Valley, towards the

Darkot Pass, the road is tolerably easy. Yassin is scantily populated, and the country appears never to have recovered from the oppressive rule of Gohr Aman, and the losses suffered in the Dogra invasion of 1863. In the Wurshigum and Kho valleys are a number of stone circles of huge boulders about three feet high, with the flat side outwards. The labour of transporting the blocks must have been very great, and it is not surprising that the work is ascribed by the inhabitants to the hand of giants of old. Major Biddulph ascended the Kho Valley westwards towards the Shandur plateau (12,000 feet) on which are situated two lakes without outlet. The Laspur district, though small, is well-populated and fertile. Mastuch (7500 feet) is a very small place, but is capable of supporting a considerable population, much land lying uncultivated. Looking down the Yarkhun Valley, a magnificent mountain called Tirich Mir fills the whole view, and looking up from Chitral in the same way it occupies the whole landscape, and is said to be equally conspicuous from Zebak in the Oxus Valley; it is also visible from a great part of Kafiristan, where it is called Meysurnoon. It is the theme of many wonderful traditions, and according to Major Biddulph's observations is 23,000 feet high. At Drasun, in Chitral territory, the Major was met by the son of Aman-ul-Mulk, the ruler of the country. Drasun is 6700 feet high, and is situated in the Mulkho Valley, about 11 miles above its junction with the Yarkhun Valley. The Mulkho, Turikho, and Tirich valleys, which form the chief part of Chitral Bala, are unmarked in any map. The Turikho and Yarkhun valleys run nearly parallel as far as the junction of the former with the Tirich, below which the united stream is called Mulkho. The latter is divided from the Yarkhun by a plain called Kargah Lusht, rising some 600 feet above, and forming the boundary between Chitral and Yassin territory. The Turikho, Tirich, and Mulkho valleys are thickly populated, and cultivation is continuous, innumerable springs gushing out everywhere; wood, however, is scarce. Below the junction of the Mulkho and Yarkhun streams the valley again narrows, and travelling becomes more difficult till within four miles of Chitral. The villages are large and populous, the land rich and fertile where cultivable, and the cultivation better and neater than in the Gilgit Valley. Major Biddulph estimates the population ruled over by Aman-ul-Mulk at not less than 150,000 souls, without counting the tribes of Siah Posh Kaffirs, who are said to be tributary. Below Chitral the valley is reported to be thickly populated and the land noted for its fertility. The number of fighting men in Chitral is estimated at 6000, if not more. The Chitralis are a handsome race, with dark gipsy-looking features; they are of very thievish habits, but differ greatly from the Afghans. Orpiment or yellow arsenic is found in great quantities in the Tirich Valley, and is exported to Peshawur. Major Biddulph inclines to think that the elevation of Chitral is only a little over 5000 feet, or consider-

ably less than 7140 feet, the height fixed by the Havildar, in his journey of 1870. It is much to be regretted that Major Biddulph had no opportunity of making a survey of his route, as it would have supplied some fresh topographical data to the work of the Havildar and the Mullah, as well as to the older surveys of Lieutenant Hayward. The information he has succeeded in acquiring respecting this portion of the north-west frontier in his various tours (we believe that this is the second or third he has undertaken within the last five years) would supply material for a very interesting volume.

Transcaucasia.—In his just published report on the Caucasian provinces, Mr. Lyall, our Consul at Tiflis, remarks that an immense extent of forest exists in that region, but that nevertheless it is of little or no commercial value. Wherever there are means of transport to a market, either by rafting down a river, or by sea, the forests have either been already denuded of good trees, or exorbitant prices are demanded for the right of felling. The mountains around Tiflis have for many years been completely cleared even of brushwood, and a similar denudation of the hill-sides is still going on throughout the valley of the Kour; the want of foresight thus shown by the inhabitants has, according to Mr. Lyall, resulted in either completely drying up, or seriously diminishing the volume of water in the rivers. He further observes that famines may be expected before long, unless measures are taken for reafforesting the mountains, or some scientific methods of irrigation introduced. The Government of the Caucasus have long had a complete reorganisation of the Forest Department under consideration, but, notwithstanding the great urgency of the matter, no reforms have yet been instituted.—Mr. Lyall also gives some information on the subject of projected railways in the Caucasian provinces. The existing railways of the Caucasus are the Rostov-Vladikavkas line, 432 miles long, and the Poti-Tiflis line, of 190 miles. The projected lines are far more extensive; that from Vladikavkas over the Dariel Pass (7900 feet) to Tiflis will, if executed, rival the grandest exploits of European engineering. A counter project is to prolong the Rostov-Vladikavkas line by way of Petrovsk and Derbend to Baku, thus turning the line of mountains and reaching Tiflis by the valley of the Kour. Either of these projects would involve enormous expense, and competent engineers consider that it would be difficult to keep the first-mentioned line in working order on account of the constant avalanches and landslips which take place in the Dariel defile, and the great snowfall. The prolongation of the Poti-Tiflis line to Baku, which has been decided upon for the last twenty years, but not yet commenced, offers no natural difficulties whatever. A short line is proposed to connect Batoum with the Poti-Tiflis railway at Samtrede, but this branch, as the Government are unwilling to construct it along the shore, would also be very costly. In conclusion, Mr. Lyall mentions that a proposition for a railway towards India,

passing through the Caucasus, viâ Erivan, into Persia, is now under discussion.

The Overflowing of the Euphrates.—In his last commercial report to the Foreign Office, Her Majesty's Consul-General at Bagdad draws attention to some matters connected with the vast irrigation system of Mesopotamia, which seems to have been so thoroughly understood by the ancients and, in his opinion, so little appreciated by the present rulers of the country. As regards this, Mr. Nixon desires to make it known that the overflow of the Euphrates in the direction of Bagdad, has resulted simply from a new cutting being made into the canal which connected the River Euphrates with the Tigris, and was a great highway of commerce. In the old system of the ancients it has been noticed that every canal cut from the River Euphrates or Tigris always took an upward course at first, contrary to the flow of the stream of the water, thus preventing any possibility of overflow. The old canal above referred to had silted up, and it was necessary to clear it from the sand of the desert; instead, however, of clearing out the old canal, Midhat Pasha sanctioned the cutting of a new canal directly into the ancient canal, by which the whole force of the River Euphrates was thrown into it, and thus caused an impetus of overflow towards the Tigris, which may yet possibly destroy hundreds of miles of cultivated land that is at present irrigated by the waters of the Euphrates. It is absolutely necessary, Mr. Nixon adds, that the Turkish Government should be urged not to neglect this important work, as the bed of the Tigris is many feet below that of the Euphrates. From the cause referred to, a province, as fertile as Egypt and growing large quantities of rice, is suffering from a scarcity of food.

New Netherlands Geographical Periodical.—Under the title 'Aardrijkskundig Weekblad,' Dr. G. J. Dozy has commenced the publication at Amsterdam of a weekly sheet, devoted to the propagation of current Geographical matter in Holland. The chief contents of the numbers as yet issued are a review of Soyaux's 'Aus West-Afrika'; accounts of the recent Arctic voyages of Captain Markham and the *Willem Barents*; and a report of the meeting of the Netherlands Geographical Society of the 11th October.

The Henry Mountains, South Utah.—This peculiar group, the very existence of which was unknown ten years ago, when it was sighted and named by Professor Powell, has now been surveyed by Mr. G. K. Gilbert, the scientific results of whose labours have just been received. It is situated in the centre of perhaps the largest district of the United States yet unexplored, owing to the difficulty of access and passage caused by physical configuration, elevation, and aridity. The mountains forming it are of comparatively small extent, occupying a circle of 18 miles' radius, and with their two most widely separated peaks only 28 miles apart: they are situated on the right bank of the Colorado

River of the West, between its tributaries the "Dirty Devil" and the "Escalante," and crossed by the meridian of $110^{\circ}45'$ and the 38th parallel. To reach them, the traveller (who must take pack-mules) starting from Salt Lake City, takes a southern route, by Salina, the last settlement, to Fish Lake, from which he reaches the mountains, after a total journey of 275 miles, by Rabbit Valley and Temple Creek Cañon. They are not a range, and have no trend, being simply a group of five elevations, separated by low passes, and without discernible system. Mount Ellen, the most northerly, is 11,250 feet; Mount Pennell, 11,150 feet; Mount Hillers, 10,500 feet; Mount Ellsworth, 8000 feet; and Mount Holmes, 7750 feet above sea-level; the desolate plain on which they all stand having a mean altitude of 5500 feet. Isolated in a desert country, and with so considerable an elevation, these mountains naturally act as local condensers of moisture, so that their upper slopes are clothed with luxuriant herbage and timber, the latter consisting of three species of Conifers, one covering a total area of 25 square miles. The vegetation, and the rainfall which produces it, are proportioned to the altitude, and the climate of each mountain is independent of the others. The ruggedness of the summits of the higher of these is proportioned inversely to their altitude, the moisture consequent upon elevation being seen to produce a sculpture of curves and gentle slopes independent of diversities of rock texture; so that the sharp carving of the cliffs of the Colorado basin is probably owing not to mightier rains than now occur, but to an extremely arid climate enduring through long ages. Economically, the products of the Henry Mountains are valueless. Such coal, building-stone, and gypsum as are found in them will, like the timber, fail for want of a present or prospective market; and there is no trace or likelihood of precious metals. But their physical structure is of the greatest interest, as being opposed to the ordinary conception of the way in which volcanic mountains are formed, namely, by igneous rocks ascending to the earth's surface and there issuing forth, building up hills by successive eruptions,—the molten lava, starting from an unknown depth, passing through superincumbent rock-beds, and piling itself on the uppermost of them. Here, however, the lava has stopped at a lower horizon, insinuated itself between two strata, and, by lifting all the superior beds into an unperforated overlying arch, opened for itself a chamber in which it has congealed, forming a massive body of trap, for which the name "Laccolite" is proposed. The peculiar rounded outline produced by these laccolites, which are exposed in various ways by erosion, is exhibited in thirty-five distinct instances (besides many smaller) in the Henry Group, where they lie in clusters, each cluster being marked by a mountain.

Gold in Surinam.—Writing from Paramaribo to the Foreign Office, Her Majesty's Consul in his last Report states that the only branch of industry of any importance in Surinam is the exploration of gold, and

that its development increases marvellously. The precious metal seems to abound in the colony, and in every district where it has been sought for, it has been found in larger or smaller quantities. The opportunity given by the Government to rent land at the nominal price of ten cents per hectare, is an inducement to almost everyone to try his fortune in the gold-fields. The gold is found in the alluvial deposits, and is obtained by a primitive process of washing with sluices and "long toms." Mr. Barnett says it is difficult to ascertain the amount of gold which is found, as people conceal the results of their explorations. In 1877, however, there was an increase of 251,000 florins, as compared with 1876, in the value exported by the steamers of the *Compagnie Générale Transatlantique* alone, and during 1878 gold to the value of 407,059 florins was exported by the same vessels against 343,780 florins in 1877. Of exports by other steamers no record is obtainable.

The North-East Passage.—Professor Nordenskiöld's Account of the 'Vega' in her Winter Quarters.

Professor Nordenskiöld's report to Mr. Oscar Dickson, forwarded from Yokohama on the 4th September, 1879, and recently published in the *Göteborgs Handels och Sjöfarts Tidning* (October 25–November 1), has put us in possession of the details of the long sojourn made by the *Vega* upon the Asiatic shores of Behring Strait. Every item of information connected with the adventures and experiences of the brave Swedes, who have opened up the Siberian coast and rivers to civilisation and commerce, cannot but be of the greatest interest to all who watch the progress of geographical discovery, and we propose therefore to give a short sketch of the principal incidents recorded in Professor Nordenskiöld's report, premising that before many months will have elapsed, we shall have before us a full account of the memorable cruise of the *Vega* from Gothenburg via the Polar Sea to Yokohama.

It was on the 27th September, 1878, that the *Vega* arrived near the promontory which bounds Koljutchin Bay on the east. Although the ship had in the course of the day passed through several patches of newly formed ice, the temperature was but little below zero, the weather was calm and fine, and nothing indicated that at the moment when she had all but completed her task, the ice would close in upon her and keep her a prisoner for many months to come.

On the 28th September, with continued clear and fine weather, the *Vega* proceeded under steam, intending to take advantage of a narrow open channel which on the previous day had been observed to extend between the shore and the masses of drift-ice which were already beginning to press closely upon the promontory. But when little more than a mile to the eastward of the latter, the water was observed to become muddy as the vessel proceeded, nor could deeper water be found among the drift-ice which during the night had become firmly bound together by newly formed ice. All attempts at further progress were fruitless, and no other course was left but to lay-to and to wait until a southerly wind should disperse the ice which barred the way, a hope which, as the sequel proved, was not to be so soon realised. The position of the *Vega* was by no means particularly safe. She lay frozen in, but not anchored, in a roadstead quite exposed to the north, and only moored to a mass of ground-ice which had stranded in a depth of about 30 feet and at a distance of about three-quarters of a mile from the land. This ice-cliff was her

only protection against the enormous ice-pressure which winter storms are wont to produce in the Polar seas. It was about 300 feet long, 80 feet broad, and its highest point rose 20 feet above the level of the sea. During the fierce storms which assailed the *Vega* in the autumn and winter, the ship, the ground-ice, and the sheet of newly formed ice in which she was held fast, were all moved together considerably nearer to the shore, a movement now and then made manifest by a groan or a creaking sound in the vessel's hull. Often also powerful explosions were heard, indicating that some old crack had widened owing to the freezing of the intruding waters. Occasionally during a storm the ice-sheet, about 20 inches thick, was driven on to the ice-blocks and split into a thousand fragments, which, tilted up by the underlying ground-ice, formed immense ramparts of loose sharp-edged pieces of ice. Any ship moored in the vicinity of these ice-blocks would have been crushed in the early part of autumn.

The spot where the *Vega* was frozen in is situated in lat. 67° 7' N., long. 173° 30' W. from Greenwich. The neighbouring land presented the aspect of a wide, slightly undulating plain, bounded on the south by hills rising gradually in the distance and attaining further inland, according to the statements made by the natives, a considerable height. The low land was occupied by extensive lagoons separated from the sea by narrow sandbanks thrown up by the waves. At the time of the *Vega's* arrival, the ground was frozen and covered with hoar-frost, but still free from snow, so that the botanists of the Expedition were able to form an idea of the flora of this hitherto unknown region. Nearest to the shore they found dense beds of "*Elymus*" interspersed with patches of *Halianthus peplodes*. A barren gravelly plain further inland was covered here and there with some kind of a black lichen, *Gyrophora proboscidea*, and a few flowering plants, among which *Armeria sibirica* was the most common. To the southward of this plain there was a region covered with lagoons and small lakes, the shores of which produced a luxurious growth of varieties of grass and sedge. But on the surrounding table-lands, where the weather-worn strata of gneiss and dolerite have formed a richer soil than the barren sandbanks thrown up by the sea, the vegetation assumes more varied colours. Here there were thickets of willows, extensive patches of craneberry (*Empetrum nigrum*), of *Andromeda tetragona*, and large tufts of a species of *Artemisia*. Between these grew during the summer—to judge from the withered and frozen plant-remains which Dr. Kjellman gathered in autumn—a varied collection of plants, some of them well-known in Europe, such as the cloudberry, whortleberry, *Taraxacum officinale*, and other plants peculiar to countries situated in the far north.

At the time the ship was frozen in, the water nearest to the shore was covered with ice, not strong enough, however, to bear the weight of a man. To seawards, as far as the eye could reach, the drift-ice was so firmly bound together by newly formed ice, that even the strong bows of the *Vega* could make no impression upon it. On the 2nd October it was possible with some precaution to walk on the ice close to the ship, and on the 3rd the Tchuktches came on board on foot. But even as late as the 10th there were weak patches between the ship and the shore, and a blue sky in the east showed the presence of open water in that direction. On the 13th October, Dr. Almqvist started on foot over the ice in a north-easterly direction following the track of some Tchuktches who had gone out walrus-hunting. After a very laborious journey, in consequence of the rough state of the ice, which consisted of drift-ice to a distance of over 12 miles, he had to return without having reached open water, which always appeared to be further off. It was now evident that the *Vega* was hemmed in by a belt of drift-ice about 18 miles broad, and there seemed little probability of the ice breaking up in the course of autumn, as had been first

expected. Lient. Brusewitz measured the thickness of the newly formed ice during the season, with the following results :—

			ft.	in.				ft.	in.
December 1st	..	..	1	10	April 1st	..	..	4	2
January 1st	..	..	3	0	May 1st	..	..	5	0
February 1st	..	..	3	6	June 1st	..	..	5	0
„ 15th	..	..	4	0	July 1st	..	..	3	4
March 1st	..	..	4	1					

Upon the narrow sandy spits which separated the lagoons from the sea were two Tchuktches' settlements. Of these, the one situated nearest to the *Vega's* winter quarters was called *Pitlekaj*, and numbered originally seven tents, but in consequence of the scarcity of food the inhabitants, in the course of the winter, moved to a district near Behring Strait which offered a more abundant supply of fish. The other settlement, *Jinretlen*, lay nearer to the promontory. It also contained seven tents, but the inhabitants appeared to be better off than those of *Pitlekaj*. Four other encampments, named *Pidlin*, *Koljutchin*, *Ryrailinop*, and *Irguanuk*, were situated at a greater distance towards the east, yet near enough to enable the inhabitants to make frequent visits to the ship. It was difficult to ascertain the number of persons belonging to each tent, as the Tchuktches were continually backwards and forwards to each other's tents, but the average number was about five or six. In all there were about two hundred natives in the vicinity of the *Vega's* winter quarters.

The arrival of the ship caused great excitement. Men, women, children, and even dogs were seen running to and fro on the beach, and it was evident that the natives were in fear of losing so splendid an opportunity of bartering for tobacco and spirits. Several vain attempts were made to put out in boats, but at last they succeeded in pushing a big canoe, covered with skins, into a channel almost free of ice. Laden to the water's edge with men and women, it was rowed out to the ship regardless of the danger of navigating so frail a craft through the sharp-edged pieces of ice. This first visit at once established the good relations between the *Vega* and the natives, which lasted during the whole of her stay. The news of the arrival must have spread very rapidly, as visitors continued to come in from more distant quarters, till at last the *Vega* was the resting-place for every passing traveller, who stopped with his team of dogs either to satisfy his curiosity, or to exchange a friendly word or some more substantial article in the shape of warm food, tobacco, or sometimes "ram," the Tchuktch equivalent for a sip of grog. They were allowed to move freely all over the deck, which was crowded with a variety of articles; nothing was ever missed, but their propensity for begging proved very troublesome. In bartering they tried to take every advantage of the Europeans. Petty cheating was apparently not considered a fault, but a legitimate means of making profit; for instance, they often sold the same object twice, and were very free in promises which they had no intention of keeping. They frequently gave a false description of the article which they offered for sale. In this way foxes, which had been skinned and had their heads and feet cut off, were sold as hares, and it was laughable to observe their astonishment when they observed that they were almost invariably found out. Their complete ignorance of money, and the small store at the disposal of the Expedition of articles suitable to their wants, necessarily enhanced the price of the latter. To the great disappointment of the natives the usual articles of commerce in the Polar regions, skins and blubber, were not to be had on board the *Vega*. On the other hand, the Expedition secured a complete collection of weapons, garments, and household utensils. Partly by giving food in return for small services rendered on board, partly by distributing it as a gift, the *Vega* had the means of alleviating the famine which usually prevails during the winter. None of the natives of the neighbourhood

were Christians, nor did any of them speak a European language excepting an occasional English word or a greeting in Russian. Lieutenant Nordqvist studied their language with so much zeal and success that after a few weeks he could make himself understood. He will bring back to Europe a complete vocabulary of this little-known language, as also an outline of its grammatical structure.

(*To be continued in the January number.*)

Obituary.

Dr. Arthur Leared, M.D. Oxon., F.R.C.P.—This eminent physician, whose death occurred on the 17th of October, was an enthusiastic traveller, and had accomplished many considerable journeys in the intervals of his professional life. He was born at Wexford in the year 1822, of an old Wexford family. Before settling down in England to the career he had chosen, he went, in 1851, to India, but made only a short stay there, the climate not suiting him. In 1852 he established himself as physician in London. The first journey made after this was to the East, in 1855, when, availing himself of the opportunity afforded him of being one of the physicians to the British Civil Hospital at Smyrna, he visited that place in the early spring of the above-named year, afterwards extending his tour to the Holy Land. In 1862 he made a voyage to Iceland, the first of four visits he made to that island, the last being in 1874, when the King of Denmark was there. He travelled over the island in all directions, and became well acquainted with its physical phenomena and its people. In the autumn of 1870 he visited America. His next journey was to Morocco, in 1872, a country which he revisited on two other occasions, in 1877 (as physician to the Portuguese embassy), and in the early part of the present year. He was able on these occasions to visit the city of Morocco, as also the two other capitals, so difficult for a European to enter, Fez and Mequinez; indeed, he enjoyed the unique privilege of a special free pass or edict, given him by the Sultan. He profited by these occasions to explore unfrequented parts of the country, and amongst other minor discoveries succeeded in identifying the site of the Roman station *Volubilis*. The results of his first two journeys were made known by him in his two works, viz. 'Morocco and the Moors,' published in 1876, and 'Visit to the Court of Morocco,' 1879. His second journey was also the subject of a paper read by him at the Geographical Section of the British Association, Dublin, in 1878.

CORRESPONDENCE.

On the Dara Nur, or Dara Nuh, in Afghanistan.

64, LINCOLN'S INN FIELDS, November 3rd, 1879.

IN Major Tanner's most interesting letter about Kafiristan and the Kafirs, as given in the last number of the 'Proceedings of the Royal Geographical Society,' he mentions the "Dara Nur," "which runs into the Kund Mountains." He translates the name as the "Valley of Light," adding thereto a note of interrogation. In March last I visited the spot, with Major Stewart of the Queen's Own Corps of Guides, who is not only an experienced topographical surveyor, but a master of the languages on the frontier as well. On that occasion I made a sketch of the valley from Islamabad, and on the authority of Arbab Mir Ahmad Khan, of Shewa, whom I take to be the same person mentioned in Major Tanner's letter, I have described my sketch as the

“Durreh Nuh,”—which I suppose in the modern system of spelling Indian names would be Dara Nuh,—or the Valley of Noah. The tradition is that the Ark rested on the Ram Kund, and that Nuh or Noah, with his family and all the living things, descended by this valley to the plains below, and hence the name. The words *Nuh* and *Nur* are so closely allied that it is quite possible they may have become mixed. There is also a relationship of ideas connected here, such, that whoever is familiar with the depths of Oriental symbolism may understand the possibility of the one word being given for the other. Still, as a mere matter of terms, it is a geographical point of importance. The name of the valley, as translated to me by Major Stewart, it will be seen agrees with the tradition connected with the mountain above it. This mountain I understood is a place of pilgrimage to both Hindus and Mahomedans in the present day, and it is believed that the Ark is still to be seen near the summit. According to Mir Ahmad Khan, who seemed rather loose in his faith on the subject, the Ark can only be seen on Fridays—the Mahomedan Sunday. It ought to be noticed that the words Ram Kund, or Koond, the Fountain of Ram, or God, are of Hindu origin, and that the name is derived from a small lake or tarn near its summit. Kund, or Koond, means a fountain, and the mountain is also known as *Unrit Kund*, or “Fountain of Immortality,”—this is also of Hindu origin. Here we have an illustration of an important point, that the old Hindu names, which go back to a very ancient date, are in many cases still retained in connection with prominent geographical features in this region,—of which the Hindu Kush may be given as a good example. The Mahomedans have, I am told, a similar tradition that the Ark rested after the Flood on the Takht-i-Sulman, of the Suliman range, on the right bank of the Indus. I may add that there are some Buddhist remains at Islampur, in the Kunar Valley; and at Kona-dey, or the “Old Village,” a couple of miles or so lower down, there is an old tope and some of the walls of an old Buddhist vihara still to be seen, and the village seems to have been built out of the remains of an older town of some importance. Mir Ahmad Khan pointed out to us the line of an old canal, or irrigation channel, along the base of the hills, which led the water from the Durreh Nuh, or Noah’s Valley, to the Dusht-i-Gumbeer, that is the Desert of Gumbeer, the desert now separating Kunar from Lughman, and which although in the present day a stony desert, was no doubt in former times a cultivated region. To this other instances could be added to show that in the Buddhist period large extents of ground were productive in the Jalalabad region which are now in a bare and desert condition. The ground between the present Jalalabad and Hada, as well as the plains between Pesh-Bolak and Chardeh, may be given as examples. These illustrations are important as showing that the country has retrograded during later times in its agricultural condition.

WILLIAM SIMPSON.

Avalanche of Peat in the Falkland Islands.

H.M.S. ‘ST. VINCENT,’ November 17th, 1879.

During the night of the 30th November, 1878, there occurred a phenomenon of a most unusual type in the Falkland Islands,—an avalanche of peat, which nearly overwhelmed the chief settlement. The peat bogs on the heights above Stanley, the chief town, gave way, and the black oozy mud rolled down the hill with a momentum which neither the iron stanchions around the reservoir nor the barriers by the sea could withstand. It broke through the backs of wooden houses, inundated the rooms, and obliged the inhabitants, rudely awakened from sleep, to flee for safety; a few pigs and calves were swallowed up in the irresistible stream, but fortunately no human lives were lost.

Stanley numbers about one hundred houses, situated at the base and irregularly dotted over the sloping face of a range of heights, which run due east and west on the south side of the harbour, and serve to protect the houses to a great extent from the cold and violence of the southerly winds. These heights are crowned by a plateau of *bog*, which is cut and utilized for fuel by the inhabitants. It is about 1000 yards in width, and from its off side a gentle declivity leads towards the sea, about half a mile distant. Townwards it slopes gently at an angle of 45° to the sea, from which its summit is about 900 yards distant.

Bogs are not usually met with on hill-tops, and it is not a little strange that though in the Falkland Islands the soil is everywhere peaty, it is only on the sides or summits of the hills that it is met with beyond a few feet in depth. Everywhere a dense, heavy, impenetrable yellow clay forms the subsurface stratum, and this, except in the localities before mentioned, occurs at from one to three feet from the surface. It is, I believe, the impenetrability of this yellow clay to the rootlets of trees, and its contiguity to the surface, that confer on the Falklands their most characteristic feature, viz. the absence of trees. In the Stanley bog it underlies the peat at a depth of from 24 to 30 feet from the surface, and played, as will presently be apparent, a very important rôle amongst the factors which brought about the disruption of the peat banks.

Preceding Weather.—The latter part of October and the earlier weeks in November were dry and warm, so much so that private water-tanks became exhausted, and by the 8th November nearly everyone was drawing his water supply from the public reservoir. Evaporation was so rapid that the few lakelets on the bog dried up, and the bog itself became deeply fissured here and there in their vicinity. These fissures were narrow but deep, and did not approach the edge of the peat banks, but, as far as I saw, were principally about the transverse centre of the plateau. On the 9th November some rain fell, and from this date to the 26th there were occasional showers daily. The winds up to this were northerly or north-westerly. The thermometer rose to $68^{\circ}\cdot2$, and the humidity ranged from 69° to 72° of saturation. The barometer oscillated within the narrow range of $29\cdot89$ and $30\cdot22$.

On the 26th November the wind veered to the south-east; a thin mizzle set in, and the barometer began to go down. On the 27th there was a dull leaden sky, a hazy atmosphere, with the same conditions of wind and rain. On the 28th it rained hard; on the 29th the barometer had fallen to $28\cdot95$, the thermometer to 46° ; the sky continued dull, hazy, and cheerless, and the rain came down more heavily. On the 30th it rained very hard indeed, and continuously; towards midnight the catastrophe occurred. A space measuring 200 by 300 yards was seen next morning to have subsided about four feet, and as its surface covering of "diddledee" and other plants remained uppermost, the flood would seem to have been constituted principally by the basement mud and waters. Here and there down the hill slope a huge piece of surface bog was met with holding its "diddledee" above the mud-stream on which it had floated—one large block about 10 feet in diameter was floated out to the entrance of the harbour, and remained there six days.

I regret that, owing to the rain-gauge having been removed some days previously, I had no means of measuring the rainfall; but I don't think that were I to estimate the fall that took place from the 26th to the giving way of the bog on the 30th at two inches, I should be over the mark. And I think it is not difficult to conceive how this acted in causing the bog to burst and the mud to sweep down the hill. I calculate that two inches of rain falling on an area equal to that of the bog from which the slip occurred are equivalent to 586,992 gallons of water, and this enormous quantity easily ran through the fissures or percolated through the dry bog to the

bottom of hard yellow clay; there its further progress downwards was checked, and as it became walled in around by solid bog, it exerted such an enormous pressure that the banks gave way where the resisting media were most feeble, viz. in the direction of the town. If this view required corroboration, it would receive it in the fact that as the men who endeavoured to cut a trench, through the further bank from the slip to direct a secondary slip away from the settlement, dug down to about 10 feet, the water imprisoned beneath hove up the superincumbent peat and filled up the trench also; when hollow-jointed tubes were sunk, the water welled up through them when a depth of 22 feet was reached; also two other slips occurred in different places on a small scale in the same bog.

What the initial velocity of the mud-stream was it would be difficult to imagine, but it must have been considerable, for next morning, when its momentum was nearly expended, it appeared to me, as it tumbled into the sea, to move at the rate of half a mile an hour.

JOHN MULVANY, M.D., Staff-Surgeon R.N.

REPORT OF THE EVENING MEETINGS, SESSION 1879-80.

First Meeting, 10th November, 1879.—The Right Honourable the Earl of NORTHBROOK, G.C.S.I., President, in the Chair.

PRESENTATION.—*J. Louis, Esq.*

ELECTIONS.—*Anthony A. Delinege, Esq.; William James Jeffery, Esq.; Sir George Kellner, K.C.M.G., C.S.I.; William John Oakes, Esq.; Navig.-Lieut. Eaton W. Petley, R.N.; Rev. William Parkes; Richard Henry Michell, Esq.; Rev. James Sibree.*

An address on opening the Session was delivered by the President, the Right Hon. the Earl of NORTHBROOK (*ante*, p. 753).

The following paper was read by Mr. C. R. Markham, Secretary:—

“On the Dutch Expedition to Central Sumatra in 1877-9,” by Professor Veth, Leyden.

For the paper and the discussion which followed it, *vide ante*, p. 759.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—October 17th: M. DAUBRÉE in the Chair. —Dr. Hamy announced that he had received good news of the progress of the French travellers, MM. Montano and Rey, who were now exploring the islands of the Eastern Archipelago. In their first letter, written from Singapore, they had described the excursion they had undertaken into the interior of the Malayan Peninsula, whilst waiting for a passage to the Philippines. During this journey they had been able to study individuals of the Mantra race, a people intermediate in their characters between the Negritos and the Malays. A second letter was dated from Manilla, where the travellers were pursuing their ethnographical observations, confirming and extending Meyer's views on the same subject.—M. Maunoir announced the return to France of Dr. Crevaux from his scientific journeys in Guiana and on the Amazons.—A paper was read by M. Revoil on his visit to the country of the Mijjerteyn Somāli. Arriving at Ras Goré, among the Wursumgalli, he travelled along

the coast as far as Bunder Marayah, but he was unable to visit the town of Allula, the inhabitants of which were at that time in revolt against the authority of the Sultan of the Mijjerteyn Somäli. After a long stay at Bunder Marayah, he returned along the coast, making a stay at Gandala, Buroli, and Bunder Gashem. Mingling freely with the inhabitants, from whom he received almost everywhere a kind reception, he was able to study the manners and customs, regarding which he spoke very favourably. In spite of their bad reputation, these Arabs are proud, independent, and brave; their honesty is great, and M. Revoil cited many proofs of it. The country is poor, and is unable to feed its inhabitants; the only natural products are gums and incense. Iron, rock-salt, guano, and lead, however, are found, but none of them have yet been worked. The Somäli are governed by a system of laws and regulations offering much analogy with that which prevailed in Europe during the middle ages, and it is curious to meet with them the customs of feudal times, and the ancient ordeal by fire. They have a profound respect for the dead, and especially for those who have died in battle; their military organisation is better than might have been expected. From their earliest age the children are placed in schools, where they are taught to pray and the use of arms, to render them capable of defending their liberty. M. Revoil had been able to draw up three itineraries between the sea and the chief town Kharkar; these itineraries start from each of the three points, Bunder Gashem, Ras Aurbeh (near Bunder Marayah) on the Gulf of Aden, and Haffun on the Indian Ocean. They are drawn up stage by stage, the first containing nine stages, the second thirteen, and the third four.

November 7th: M. DAUBRÉE in the Chair.—The President of the Geographical Society of Lyons announced the foundation of another local Society devoted to the same pursuit, viz. at Saint-Étienne. He also stated that a congress would be held at Lyons in 1881 to discuss geographical questions relating to Africa.—A paper was read by M. Germonde de Lavigne on the altitudes above the sea-level attained by railways in Spain. On the North Spain Railway, at the Passage of the Brujula in entering on the central plateau of Castille, the line lay at 3063 feet; at the passage of the Guadarrama, where the culminating point of the railroad is under the tunnel of the Cañada, the height is 4460 feet. In the south of Spain the altitudes are much less, for in the defile of Despeña-perros, in the Sierra Morena, the railway reaches only a height of 2484 feet.—A letter was read from M. de Quatrefages on the subject of the Indian elephants presented by the King of the Belgians to the International Expedition in Africa, in which he stated that the animal which had died at Mpwapwa had succumbed not to the bites of the tsetse fly, but to an accidental malady. On this subject M. Harmand expressed the opinion that in a hot or dry climate like Africa elephants could not be made use of, as they required a great quantity of water. It would be preferable to bring over mahouts to train the African animals. M. Maunoir replied that African elephants had been sent to India, and mahouts had been sent over to Africa, and moreover, that the route followed by the Belgian Expedition was through a well-wooded and not a sandy country.—M. Maunoir announced that Captain Prier had completed the connection of the African survey with the Hispano-European network. Measurements had been taken from Mulhacen (11,480 feet) and Tetica (9184 feet) (in Spain), Filhausen (3730 feet), and M'Sabiba (1919 feet), in Africa. Thanks to the light-rays obtained by the Gramme engine, two immense triangles had been projected over the Mediterranean. The triangulation now extends without interruption from the Shetland Islands to the heart of the Sahara.—M. Soleillet then gave a narration of his recent journey from Kuniakary to Segou on the Niger. The resident population of Segou, he said, was about 12,000, but during market days there were 40,000 to 50,000 people in the town.

Geographical Society of Berlin.—November 8th: DR. NACHTIGAL, President, in the Chair.—After the annual election of the Council of the Society, at which Dr. Nachtigal was re-elected President, Dr. Reiss and Captain v. Schleinitz Vice-Presidents, Dr. Nachtigal communicated a few extracts from a letter recently received from Gerhard Rohlfs, giving the principal details of the misfortune which has overtaken the Expedition in the Kufarah Oasis. The Turkish governor of Benghazi (as is well known, Benghazi has a few months ago been raised to the rank of a vilayet or province) had, at the time of the departure of the Expedition, committed the imprudence of throwing three chiefs of the Suia tribe into prison, with the intention of retaining them as hostages until the Expedition should have reached Wadai in safety. It remains to be seen whether this proceeding was resorted to for the protection of the travellers only, or whether the Governor's object was not rather to put some pressure upon the Suias in order to enforce the payment of taxes, which had been in arrear for years. Scarcely had the Expedition arrived in the Kufarah Oasis, and encamped at some distance from the principal settlements so as to avoid too close contact with the fanatical inhabitants, when the Suias, enraged at the action of the Governor, threatened with arms in hand the lives of Dr. Rohlfs and Dr. Stecker. The travellers' effects, as well as the presents sent by the Emperor of Germany, had to be surrendered; both instruments and presents were destroyed, and but little was saved. Thanks to the intervention of a few cooler-headed Senussis, a portion of the stolen money was restored, as also the camels, upon which the travellers effected a hasty retreat towards Benghazi. As the Suias had, according to a written contract with the Governor, undertaken to escort the Expedition as far as Wadai in return for a sum of 6000 francs, we must suppose that this surprise and plunder of the travellers was meant as an act of revenge for the unjust imprisonment of the three Suia chiefs. The resources which remain to the Expedition will only be available for a new journey into the interior, when new supplies have been received from Berlin. As Dr. Rohlfs will immediately return to Germany, Dr. Stecker would endeavour, in the case of a new expedition, to penetrate by Fezzan and Bornu towards Adamawa and further south, the route by Kufarah having become impracticable. Time will show whether the Governor of Benghazi is able or willing to indemnify the Expedition for the damage inflicted on it in Turkish territory, and which is estimated at 20,000 francs. Steps to this effect have already been taken by the German Minister at Constantinople.—A letter has been received from Dr. Buchner, dated the 10th August, from the Lui River in Songoland, in which he reports that he intends to proceed eastwards along the route followed by Schutt, as the road selected on a previous occasion by Dr. Pogge is said to be closed up by a war which has broken out in that quarter.—Dr. Lenz, who has, as already announced, set out for Morocco by direction of the German African Society, writes from Tangier that he has fallen in with the well-known traveller Rabbi Mardochai, who has advised him to proceed by Fez, Morocco, and Farudant, towards the Tafilet Oasis, and to penetrate thence into the Atlas Range.—Civil-Engineer Denhardt has returned from East Africa in a suffering state of health, and proposes to work out his surveys on the lower Dana River.—The meeting concluded with a paper read by Captain v. Schleinitz on the Marquesas Islands.

Geographical Society of Leipzig.—October 29th, 1879: Professor ZIRKEL in the Chair.—The late President, Prof. Dr. Bruhns, who retired in the beginning of this year, was unanimously elected Honorary Member, in acknowledgment of the many important services he has rendered the Society during a period of eighteen years. A report was then read by Dr. Pechuel-Loesche on the meeting of the German African Society at Berlin on the 12th October, and on the preliminary steps taken for the

foundation of a German Geographical Society to embrace the different Geographical Societies now existing in Germany.—Professor Dr. O. Delitsch read a paper on Carl Ritter, to commemorate the centenary of his birthday, which the Society had been unable to celebrate on the proper birthday in August on account of its falling in the vacation.—O. Schutt, who has lately returned from Africa, where he had been sent by the German African Society to prosecute the work which the late traveller Mohr had undertaken, read a report on his explorations, which he commenced from Loanda as a starting-point. After his arrival, on the 10th December, 1877, he proceeded in a small steamer up the Quanza as far as Dondo. From thence he had to travel by land, by a good and perfectly secure road, to Malange; from here everything had to be carried by blacks. Allowing the rainy season to pass by, he started on his journey on the 5th of June, hoping to cross the Quango in the country of the Bengala. But here he was robbed of everything, and had to return. He then took a circuitous course, crossed the Quango in the country of the peaceable Longo, and reached without hindrance Quimbundo, also passing through the Minungo and Quioco. A march of two and a half months' duration brought him to Mai, king of the Luba north of the Luuda, and he passed on the way a number of nearly parallel-running streams, as the Cuiiu, the Quengo, and the Loangue, all emptying themselves, after a long course, into the Congo. During his journey he was joined by thirty Cachilaugue prisoners of the Quioco, who were returning to their own country north-east of the Mai country on the Lulua and the great lake Mucamba. Here, however, he was soon compelled by Musevo, the son of the Muata Yamvo, who had quietly followed him on the opposite bank of the Luaximo, to accompany him to his own capital, where, after having been detained for a considerable time, he was at last allowed to return, Musevo seeing there was nothing to be gained from the now really destitute traveller. He then took a nearly westerly course, crossing all the rivers, and passed unmolested the country of the Bangala, reaching Malange on the 12th of May.

NEW BOOKS.

(By E. C. RYE, *Librarian* R.G.S.)

EUROPE.

Baker, Sir S. W.—Cyprus as I saw it in 1879. London (Macmillan): 1879, 8vo., pp. 501, pl.

Contains the author's personal observations on the physical geography of the island and its capabilities, based on an experience of nine months. The Appendix contains meteorological data, fiscal details, &c., and an identification of the Biblical "Chittim wood" with a species of cedar found between Kyku and Krysokhus.

Cyprus.—Aperçu rapide sur l'Île de Chypre. Rôle actuel, Transformation, Histoire. Esquisse géographique de la Nouvelle Colonie Anglaise. Montpellier (Boehm): 1879, 8vo., pp. 94, map, scale 1:500,000. (*Williams and Norgate.*)

Hassall, A. H.—San Remo and the Western Riviera climatically and medically considered. London (Longmans): 1879, 8vo., pp. 279, frontisp., map, woodcuts.

The author has during two winters personally explored the Mediterranean shore lying between Nice and Genoa, on which his work claims to be the first exhaustive treatise. Considerable attention is paid in it to the meteorology, geology, and flora of the region discussed, with much local topography. The map (scale 10 miles to the inch) includes the Mediterranean littoral from Genoa to a little below Cannes.

Lenthéric, Charles.—*La Provence Maritime, Ancienne et Moderne: La Ciotat, Tauroentum, Toulon, Hyères, Les Maures et L'Estérel, Fréjus, Cannes et Lérins, Antibes, Nice et Cimiez, Menton et Monaco.* Paris (Plon): [1880] 12mo., pp. 540, maps, plans. (*Dulaud.*)

This study of the French Mediterranean littoral will be found of considerable assistance in the reconciliation of the ancient and modern geography of its subject, though pervaded by a sentimental tone somewhat foreign to scientific treatment. Its scope is sufficiently indicated by the title. The maps represent Roman roads and the maritime route between Marseilles and Italy, Cassis and Port Miou, the ruins of Tauroentum (still called Tarento, between Embiez and La Ciotat), Pentinger's tables for the space between Marseilles and Italy, the lagoon and valley of Argens in the first ages of the present era, ancient and modern Fréjus, the coasts of Provence, ancient and modern Nice, and Monaco with the neighbouring commune of La Turbie.

Scott-Stevenson, E.—*Our Home in Cyprus.* London (Chapman and Hall): [1880] 8vo., pp. 332, map, illustrations.

The authoress, wife of the Civil Commissioner of Kyrenia, here records her experiences during a year's residence in the island, especially as regards the climate, which is culogised. The map is on the scale of 12 miles to the inch.

Whymper, E.—*The Ascent of the Matterhorn.* London (Murray): [1880], 8vo., pp. 325, maps, pls.

A history of attempts (successful and otherwise) to scale the Matterhorn, with an account of Mt. Pelvoux in Dauphiné. The work is illustrated in the author's best manner, and contains much information on the topography and formation of these mountains. The maps illustrate the Matterhorn and its glaciers (scale, slightly over 1 mile to the inch) and the valley of Zermatt and the Central Pennine Alps (scale $1\frac{1}{2}$ mile to the inch).

ASIA.

Dupuis, J.—*L'Ouverture du Fleuve-Rouge au commerce et les événements du Tong-kin, 1872-73. Journal de voyage et d'expédition de J. Dupuis.* Paris (Challamel): 1879, 4to., map. (*Dulaud.*)

This work (to which the Marquis de Croizier contributes a preface) forms vol. ii. of the "Mémoires de la Société Académique Indo-Chinoise," of which Society the "Annales de l'Extrême Orient" are the Bulletin. The map is professedly from unpublished sources.

Heyd, Wilhelm.—*Geschichte des Levantehandels im Mittelalter.* Stuttgart (Cotta): 1879, 2 vols. 8vo., pp. 604 & 781. (*Williams & Norgate.*)

This history of the trade of the Levant in the Middle Ages contains an immense mass of information, quotation and references to the various routes through which commerce passed from the remotest parts of Asia, Egypt, &c., on its way to European markets, from the time of Justinian (A.D. 527) to the appearance of the Portuguese in India and the Osmanli invasion of Egypt, which practically put an end to trade in that direction. An alphabetical list is given of accounts of travels in the regions and during the period discussed, supplemented by an enumeration of the maps also illustrating the subject; and a copious Index enables easy reference to be made to the many details of mediæval geography in the body of the work.

Medlicott, H. B., and Blanford, W. T.—*A Manual of the Geology of India.* Chiefly compiled from the observations of the Geological Survey. Published by order of the Government of India. Calcutta (Geological Survey Office) and London (Trübner): 1879, 2 vols. text, large 8vo., pp. 1-444, 445-817, map, pls., and map separate.

Although professing to be more of the nature of a progress report than of a finished work, this publication will be found of considerable service to the student of Indian geography, as, in addition to its general discussion of the physical

geography of the Indian Empire, the superficial configuration, great local features, drainage lines, &c., of the areas into which its subject matter is divided are separately treated in detail, and are easy of reference, owing to the good Index. It is moreover the only work containing collected observations on the whole of India in a branch of science inseparable from geography. The whole region is divided into Peninsular and Extra-peninsular areas, separated by the great Indo-Gangetic alluvial low-level plain; and this division is not merely geographical, as shown by the trenchant division between the formation of the Indian peninsular rocks and those of the various mountains of Sind, the Punjab, the Himalayas, Assam, and Burma, which are marked by great disturbances affecting all the formations, and by the coincidence of their direction with synclinal and anticlinal axes. The directions of all the ranges are shown on the map, and an attempt is made to settle their nomenclature.

The separate map is based upon that on the scale of 64 miles to the inch, or 1:4,055,040, from the office of the Surveyor-General of India, as the only one available; and it has been elaborated by the officers of the Geological Survey. The mountain ranges are not laid down upon it, and apology is made for an inevitable confusion in the spelling and for the omission of names of small places, owing to the scale.

Musschenbroek, S. C. J. W. van.—*Toelichtingen behoorende bij de Kaart van de Bocht van Tomini of Gorontalo en aangrenzende Landen, de Reeden, Afvoerplaatsen, binnenlandsche Wegen en andere Middelen van Gemeenschap.* Amsterdam (Brinkman): 1879, 4to., pp. 18, map.

The author, formerly Resident at Menado, here gives an explanatory account of the physical formation, means of communication, and other topographical particulars of the two north-eastern arms of Celebes, enclosing the bay of Tomini or Gorontalo, with the outlying islands. The map is on the large scale of 12½ miles to the inch, and includes 5 insets of local detail. The memoir appears to be an advance copy of part of the Journal of the Netherlands Geographical Society.

Schefer, Charles.—*Relation de l'Ambassade au Kharezm de Riza Qouly Khan.* Paris (Leroux): 1879, large 8vo, pp. 334, map.

This forms No. iv. of the "Publications de l'École des langues Orientales vivantes," and consists of a translation with notes of the account in Persian by Riza Qouly Khan of his embassy from Teheran by order of Nazir Eddin Shah to Mohammed Emin Khan at Khiva in 1851. Much detail is given in it of the route taken from Northern Persia by the western edge of the Kara-kum to Khiva, and of the condition at that time of various localities in Western Central Asia, now of especial interest. The map, which is somewhat confusing, covers a large space of territory, including Herat and Bokhara.

Schlagintweit-Sakünlünski, H. von.—*Reisen in Indien und Hochasien. Eine Darstellung der Landschaft, der Cultur und Sitten der Bewohner, in Verbindung mit klimatischen und geologischen Verhältnissen. Vierter Band. Hochasien. III. Ost-Turkistán und Umgebungen.* Jena (Costenoble): [1880] 8vo, pp. 556, pls. (*Dulau*.)

This third part of the author's Central Asia, referring to Eastern Turkistan and neighbouring countries, apparently concludes the whole work, of which it forms vol. iv. (vol. iii. was published in 1872, vol. ii. in 1871, and vol. i. in 1869). It is based upon the results of the scientific mission of the author with his brothers Adolph and Robert, in 1854-58, to which our Government so largely contributed, and which have been long ago published in English. The present vol. contains the narrative referring to the Karakorum region, the Kuenlun range, the journey to Khotan and the return to Ladak by the Karakash valley; Adolph Schlagintweit's journey to Kashgar, and particulars of his murder; historical notices of prior and subsequent voyages to northern Central Asia and East Turkistan; and scientific appendices of elevations, isotherms, temperatures, climatic zones, &c. Profiles are given of different parts of the Karakorum and Kuenlun ranges.

Ujfalvy de Mezö-Kövesd, C. E. de.—*Résultats Anthropologiques d'un Voyage en Asie Centrale, communiqués au Congrès Anthropologique de Moscou (Août, 1878).* Paris (Leroux): [1880] large 8vo., pp. 48. (*Williams & Norgate.*)

This part of the publications of the results of the French Scientific Expedition to Russia, Siberia, and Turkistan, may be taken in connection with the work by the same author mentioned *antea*, p. 405. The Eranians of Central Asia are divided into two branches, the Galtchas, Karateghinois, and other Tadjiks of the mountains, who represent the purest type, and the Tadjiks of the plains; the Kirghiz-Kazaks of Turkistan and the Kara-Kirghises are pure Turco-Mongolians, much purer than the Usbeks.

Walker, J. T.—*Account of the Operations of the Great Trigonometrical Survey of India.* Vols. II., III., IV. Dehra Dun (O'Connor): 1879, 4to, maps, pls.

The simultaneous issue of three volumes of this important undertaking after so long an interval (vol. i. having been published in 1870), is not to be ascribed to any cessation of work or neglect on the part of the staff during that period, but to the fact that vols. iii. & iv. (respectively dated 1873 and 1876, but not issued until now) contained particulars of computation and other work carried on simultaneously with that recorded in vol. ii., but which would have been incomplete without the numerical details given in that volume.

Vol. II. (pp. 318), commences with an analysis of vol. i. (which contains the standards of measure and the base-lines, and an introductory account of the early operations of the Survey from 1800 to 1830), and comprises the history and general description of the Triangulation and of its reduction. The 11 plates illustrate various instruments, &c., employed in the survey; the maps are (1) an index to the survey, (2) a skeleton chart of the principal chains of triangles west of the 92nd meridian, and (3) a reduction chart of the North-west Quadrilateral.

Vol. III. contains the Base-line figures, the Karachi Longitudinal, North West Himalaya, and Great Indus series of the North-west Quadrilateral, of which the map is a reduction.

Vol. IV. includes the Great Arc (section 24°-30°), Rahun, Gurhagarh and Jogi-Tila meridional series, and the Sutlej series of the North-west Quadrilateral, illustrated by a similar map to that in vol. iii.

Colonel Walker acknowledges in the highest terms the assistance of Mr. J. B. N. Hennessey and Mr. W. H. Cole, and specially warns that all the values of longitudes in these volumes require a constant correction, probably of -3'.

AFRICA.

Burdo, Adolphe.—*Niger et Bénoué. Voyage dans l'Afrique Centrale.* Paris (Plon): [1880] 12mo., pp. 295, map, pls. (*Williams & Norgate.*)

The author visited the West Coast in the spring of 1878, and narrates his personal experiences on the lower courses of the two rivers mentioned in the title. This map covers from 2° 35' to 9° 25' E. long., and from 2° 50' to 9° 45' N. lat., showing the positions of missions and European factories, and the distribution of the tribes conquered by the "Fulanis," under the Sultau of Sokoto. The river Bonny is hypothetically connected direct with the Benue (or Chadda) under the names of "Okoloba" and "Okari," instead of, as usual, being made to form part of the delta of the Niger; various new features are also introduced in the lower course of the latter river, especially as regards the course of the Inam, on the left bank opposite Asaba, which is made to assume almost a circular form, enclosing a large island. Various affluents on the right bank are also delineated.

Hartmann, Robert.—*Die Völker Afrikas.* Leipzig (Brockhaus): 1879, 12mo., pp. 342, woodcuts. (*Williams & Norgate.*)

This useful and handy guide to a knowledge of African ethnology forms vol. xxxviii. of the "Internationale wissenschaftliche Bibliothek," a series comprising works by standard authors of all nationalities on various scientific subjects. The author's larger work, 'Die Nigritier,' is a sufficient indication

of his fitness as an instructor on the African races, and the full Index and numerous woodcuts (94, whereof several are original, and most of the remainder from good sources, including Fritsch's works), materially contribute to the utility of the present book.

Natal.—*Précis of Information concerning the Colony of Natal, with a map.* Prepared in the Intelligence Branch of the Quartermaster-General's Department, Horse Guards, War Office. Corrected to June, 1879. London (Harrison): 1879, 8vo., pp. 163, map in cover.

After a description of the geography, topography, and geological formation of the Colony, this work contains accounts of its harbours, means of communication, towns and settlements, military posts, dockyards, climate, trade, inhabitants, history, internal administration, and other economical and political aspects, with list of books of reference. Minute topographical and financial details are added in appendices. The map (scale 1 : 633,600, or 10 miles to the inch) does not show mountains, but is well worked up to date as to towns, &c.

AMERICA.

Bertrand, Alejandro.—*Departamento de Tarapacá. Aspecto jeneral del Terreno, su Clima, i sus Producciones.* Santiago de Chile (Nuñez): 1879, 8vo., pp. 32, tables, map.

This description of the southern extremity of the Peruvian Republic, containing the valuable littoral guano deposits of Chipana, Guanillos, Punta de Lobos, &c., and the various deposits of nitrate of soda and nitrate of potash on the western side of the Pampa del Tamarugal, has been extended from a first edition in the spring of this year by information received from Chilean residents in Tarapacá who have left that department in consequence of the present war, and thereby reduced its population by about a third. The map includes the coast from 19° to 24° S. lat., comprising the strip of territory that contains the Atacama and Antofagasta saline deposits and Caracoles silver-mines, intervening between Peru and Chili.

Esguerra, Joaquin.—*Diccionario Jeográfico de los Estados Unidos de Colombia.* Bogotá (Gaitan): 1879, 8vo., pp. 284.

This Gazetteer is apparently the first work of the kind referring to the country. It is based on the best available authorities and official statistics; and from the prefixed reviews appears to be well received by those best able to test its accuracy. Longitudes given in it are from the meridian of Bogotá, and temperatures centigrade. A list is added of the various heads of the Government, commencing with the native rulers in 1470.

Gormáz, Francisco Vidal.—*Jeografía Nautica i Derrotero de las Costas del Peru, arreglado segun los Documentos mas modernos por la Oficina Hidrográfica de Chile.* Santiago (Imprenta Nacional): 1879, 8vo., pp. 191.

A compilation from official and other trustworthy modern sources of information on Peruvian coast geography, apparently for the use of Chilean war-ships.

Thielmann, Max von.—*Vier Wege durch Amerika.* Leipzig (Duncker & Humblot): 1879, 4to., pp. 584, pls., maps. (*Asher*.)

The author, well-known for his work in the Caucasus, gives accounts of his journeys (1) in the Indian territories, Texas, Kansas, Colorado, Wyoming, and California, in 1875; (2) in Cuba and Mexico, during the following year; (3) in Colombia and Ecuador; and (4) along the Peruvian and Chilean coasts, Argentine States, and Brazil. His attention seems to have been turned principally to botanical subjects and mountain work, and the special interest lies in his travels in Colombia and Ecuador. Starting from the mouth of the Magdalena, he followed that river to Boca Tacaloe, and after a detour to the west by Magangué and

Guamal, again struck it, following it south to Paturia. Thence he reached in succession Bucaramanga, Piedecuesta, Socorro, Chiquinquirá, and Bogotá, from which city he turned westward to the upper Magdalena, crossing it and traversing the Cordillera to Cartago, on the upper Cauca river, following the valley of the latter to its head waters at Popayan. The Ecuador boundary was reached at Tulcan via Pasto and Túquerres, and the traveller arrived at Guayaquil, after visiting Quito, Cotopaxi, Latacunga, and Guaranda. This part of the journey was in the autumn and winter of 1877, and January 1878, and a table is given of it, showing the elevations reached on each day during that period, and the distances travelled. On the 15th January, 1878, Baron Thielmann reached the north-west summit of Cotopaxi, 19,735 feet above the sea; finding no danger or difficulty in the ascent, which is merely a steep snow incline; the limit of eternal snow is about 15,400 feet. During his travels in Mexico, Baron Thielmann also ascended Popocatepetl, a somewhat monotonous exploit, without danger. At 17,884 feet, the air was warm and heavy; the crater itself (which was not descended, owing to the amount of sulphurous vapours) is described as overpoweringly awful.

The maps show the portions of Colombia and Ecuador traversed by the author (scale 1:3,500,000), and Cotopaxi and surrounding country (scale 1:200,000).

It is impossible to conclude this notice without praise for the execution of the plates and maps, as well as the general mechanical excellence of the work.

Vergara, Ramon Guerrero.—Noticias sobre las Provincias del Litoral correspondiente al Departamento de Lima i de la Provincia Constitucional del Callao, por la Oficina Hidrográfica. Santiago (Imprenta Nacional): 1879, 8vo., pp. 75, map.

Contains a general description, and special accounts of the river systems, coasts, orography, roads, and railways of the Department of Lima, with local particulars of the districts into which it is divided, including the constitutional province of Callao. The map (scale 1:150,000) takes in the coast from Chancay (11° 34' S. lat.) to Chilca (12° 20' S. lat.). The publication of this work in Chili at the present time is presumably for war purposes.

AUSTRALASIA.

Van der Aa, P. J. B. C. Robidé.—Reizen naar Nederlandsch Nieuw-Guinea, ondernomen op Last der Regeering van Nederlandsch-Indie in de Jaren 1871, 1872, 1875–1876, door de Heeren P. Van der Crab en J. E. Teysmann, J. G. Coorengel, en A. J. Langeveldt Van Hemert en P. Swaan, met geschied- en aardrijkskundige Toelichtingen. 'SGravenhage (Nijhoff): 1879, 8vo., pp. 480, maps. (*Dulau.*)

Contains accounts (1) of a journey made by Mr. Van der Crab, a Commissioner of the Government of the Netherlands-Indies, in Maccluer Bay, Geelvink Bay, and Humboldt Bay, New Guinea, from August to November 1871, in the steamer *Dassoon*, with extracts from the journal of his companion, Mr. Teysmann, Hon. Inspector of Colonial Agriculture, chiefly referring to botanical subjects; (2) of a journey to Mysol, Onin, and Geelvink Bay by Mr. J. G. Coorengel, also a Government Commissioner, in October and December 1872; and (3) of the journey by A. J. Langeveldt van Hemert and Captain P. Swaan, in the steamer *Soerabaja*, to various parts of the north and west coasts of New Guinea, from November 1875 to March 1876. The Appendices contain, among other matters referring to the Papuan Islands, a chronological review of travels in Netherlands New Guinea since the restoration of the Dutch authority in the Moluccas, critical observations on the maps accompanying the work, linguistic material, &c. The maps are a sketch of Papoea-Kowiai from the discoveries of Miklucho Maklay, by Lieut. Waldeck; and a general map of Netherlands New Guinea, showing the course of the *Soerabaja*, with an inset (scale 1:1,000,000) of Telok Berau, or Maccluer Bay, giving soundings.

GENERAL.

Bridges, E. S.—Round the World in Six Months. London (Hurst and Blackett): 1879, 8vo., pp. 299, no Index.

Describes the journey viâ New York, California, Japan, China, and India. Hints on clothing, cost, &c., are given, with other information likely to be of use to travellers.

Harrison, W. A.—A Manual of Physiography. London (Bemrose): 1879, 12mo., pp. 158, woodcuts.

This manual embodies the substance of a course of lectures delivered to students of Physiography, and based upon the syllabus issued by the Science and Art Department, of which it discusses all the subjects both in the elementary and advanced stages.

Inclan, Julian Suarez.—Tratado de Topografia. Madrid (Imprenta Nacional): 1879, Text 4to., pp. 558, Atlas fo., 41 pls. (*Dulau.*)

This treatise on theoretical and practical geodesy contains instructions on all branches of surveying, mensuration, fixing positions, &c., with accounts of the best scientific instruments, and the methods of using them to the best advantage.

Klein, —, & Thomé —.—Die Erde und ihr organisches Leben. Ein geographisches Hausbuch. Lieferung 1. Stuttgart (Spemann): 1879, 8vo., pp. 32, pls. (*Williams & Norgate.*)

The first number of a new illustrated periodical (to be completed in about 50 parts) upon physical geography, intended to serve as a companion to Von Hellwald's 'Erde und ihre Völker.'

Meucci, F.—Il Globo Celeste Arabico del Secolo XI. esistente nel Gabinetto degli Strumenti antichi di Astronomia, de Fisica, e di Matematica del R. Istituto di Studi Superiori. Firenze (Le Monnier): [1878] large 8vo., pp. 13, tables, pls. (*Dulau.*)

This publication of the Royal Florentine Institute of Higher Practical Studies and Improvement, apart from its interest as illustrating antiquarian physical science, contains a transliteration and translation of the Arabic names of various constellations, &c.

Montégut, Emile.—L'Angleterre et ses Colonies Australes, Australie, Nouvelle-Zélande, Afrique Australe. Paris (Hachette): 1879, 12mo., pp. 304. (*Williams & Norgate.*)

Sachot, O.—Récit de Voyages, Nègres et Papous. L'Afrique Équatoriale et la Nouvelle-Guinée. Paris (Ducrocq): 1879, 12mo., pp. 356, maps. (*Dulau.*)

A summary of modern voyages in the regions named.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Erhard, —.—Carte administrative du département de la Haute-Loire: Canton de Bas, Canton de Montfaucon, Canton de Saint-Didier (la Séauve), Canton de Saint Julien (Chapteuil), Canton de Monistrol (sur-Loire). Scale 1:49,000 or 1·4 inch to a geographical mile. Erhard, Paris. (*Dulau.*)

Service Vicinal.—Carte de France dressée par le Service Vicinal, par ordre du Ministre de l'Intérieur. Scale 1:100,000 or 1·3 geographical mile to an inch. Erhard, Paris, 1879. (*Dulau*.)

The Ministre de l'Intérieur has just issued the first twenty sheets of this map, printed in red, blue, green, and black, to distinguish the roads, water-courses, forests, and other objects. The publication will be continued in regular course, and when complete will comprise upwards of five hundred sheets, of which more than one hundred are already in the engraver's hands, and some three hundred and sixty are now in actual preparation.

Serné, S. H., en A. Van Otterloo.—Kaart van de Middellandsche Zee en Aangrenzende Kustlanden; naar de beste bronnen bewerkt door S. H. Serné en A. Van Otterloo. Scale 1:3,750,000 or 51 geographical miles to an inch. C. L. Brinkman, Amsterdam, 1879. 2 sheets. (*Dulau*.)

This is a two-sheet map, lithographed and coloured, without hill shading; it contains much useful information as to means of communication, both by land and sea, and being very clearly drawn it is well adapted to the purpose of general reference. There are also given on inset maps, numerous well-executed plans of the principal ports of the Mediterranean Sea, with soundings, and a plan of the Suez Canal on the scale of 9 geographical miles to an inch.

ORDNANCE SURVEY MAPS.

6-inch—County Maps:—

ENGLAND: Kent, No. 6, published on Sheet 13.

SUSSEX: Nos. 14, 25, 51, 52, 65, and 78.

25-inch—Parish Maps:—

ENGLAND AND WALES:—Berks: Letcombe Regis, 14 sheets; St. Lawrence Reading, 4 sheets; Uffington, 17 sheets; West Ilsley, 10 sheets; Ardington (in completion), 2 sheets; East Hendred (in completion), 2 sheets; East Lockinge (in completion), 4 sheets; Wantage (in completion), 3 sheets; West Hendred (in completion), 2 sheets. Cornwall: Breage, 20 sheets; Gunwalloe, 6 sheets; Gwithian, 8 sheets; Sithney, 16 sheets; Uny Lelant, 9 sheets. Caermarthenshire: Llandeilo Fawr, 4 additional sheets; Llangadog Fawr, 4 additional sheets. Glamorganshire: Knelston, 2 sheets; Llanddeive, 6 sheets; Llangenydd, and ditto detached, 10 sheets; Oxwich, 5 sheets; Penmaen, 6 sheets; Penrice, and ditto detached, 11 sheets; Sully, and ditto detached, 7 sheets; Nicholaston and Cefn-y-byrn, 5 sheets; Rhos-Sili, 9 sheets. Oxfordshire: Elsfeld and Lyme Hill, 2 sheets; Marston, 3 sheets; Wood Eaton and Forest-Farm, 1 sheet.

Town Plans:

ENGLAND: Bucks: Aylesbury, 10 feet, 10 sheets. Notts: Mansfield (in completion), 10 feet, 2 sheets. Stafford: Tunstall (part of), 14 sheets; Binslem (part of), 52 sheets; Binslem, 6 additional sheets; Hanley, 6 additional sheets.

Index Map:—

SCOTLAND: Elgin, scale 2 miles to an inch. (*Stanford, agent*.)

Petermann's 'Geographische Mittheilungen.'—Geologische Karte von Vorder-Indien reducirt von H. B. Medlicott und W. T. Blanford's "Preliminary Sketch of the Geology of India" auf A. Petermann's Karte in 2 Bl. Scale 1:7,500,000 or 102·1 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 21. (*Dulau*.)

— Karte von Dr. A. Regel's Reisen in Central Asien 1876-79, sowie der Routen von Kuropatkin 1876-77, und Przewalsky 1877. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 20. (*Dulau*.)

— Die Umgegend der Bai von Tökio und des Vulkans Fuji-no-Yama. Mit Unterstützung von Professor J. Rein und Tadashi Sanda gezeichnet von B. Hasenstein. Scale 1:400,000 or 5·5 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 19. (*Dulau*.)

Telfer, Commandér R. N., J. Buchan.—Map illustrative of the travels of Johann Schiltberger 1394–1427, by Commander J. Buchan Telfer, R.N. Scale 1 : 20,000,000 or 266·6 geographical miles to an inch. Printed for the Hakluyt Society. 1879.

AFRICA.

Chavanne, Dr. Jos.—Carte murale physique de l'Afrique dressée et dessinée par le Dr. Jos. Chavanne, revue par Henri Duveyrier. Scale 1 : 8,000,000 or 109·5 geographical miles to an inch. Ed. Holzcl. Vienna, 1879. (*Dulau.*)

This map is accompanied by several sheets of letterpress.

Intelligence Branch, Quartermaster-General's Department.—Sketch Map of Natal. Scale 1 : 633,600 or 8·6 geographical miles to an inch. Compiled and Lithographed at the Intelligence Branch, Quartermaster-General's Department. 1879.

AMERICA.

Petermann's 'Geographische Mittheilungen.'—Francisco P. Moreno's Erforschung eines Theiles von Patagonien 1876 und 1877. Scale 1 : 1,750,000 or 23·9 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1879. Tafel 22. (*Dulau.*)

AUSTRALIA.

Surveyor-General of Victoria.—Map of Continental Australia, from the most recent information and materials supplied by the Survey Departments of the several Colonies. Constructed and engraved at the Department of Lands and Survey, Melbourne, under the direction of A. J. Skene, M.A., Surveyor-General of Victoria, 14th June, 1879. Scale 1 : 3,127,000 or 41·3 geographical miles to an inch.

EAST INDIAN ARCHIPELAGO.

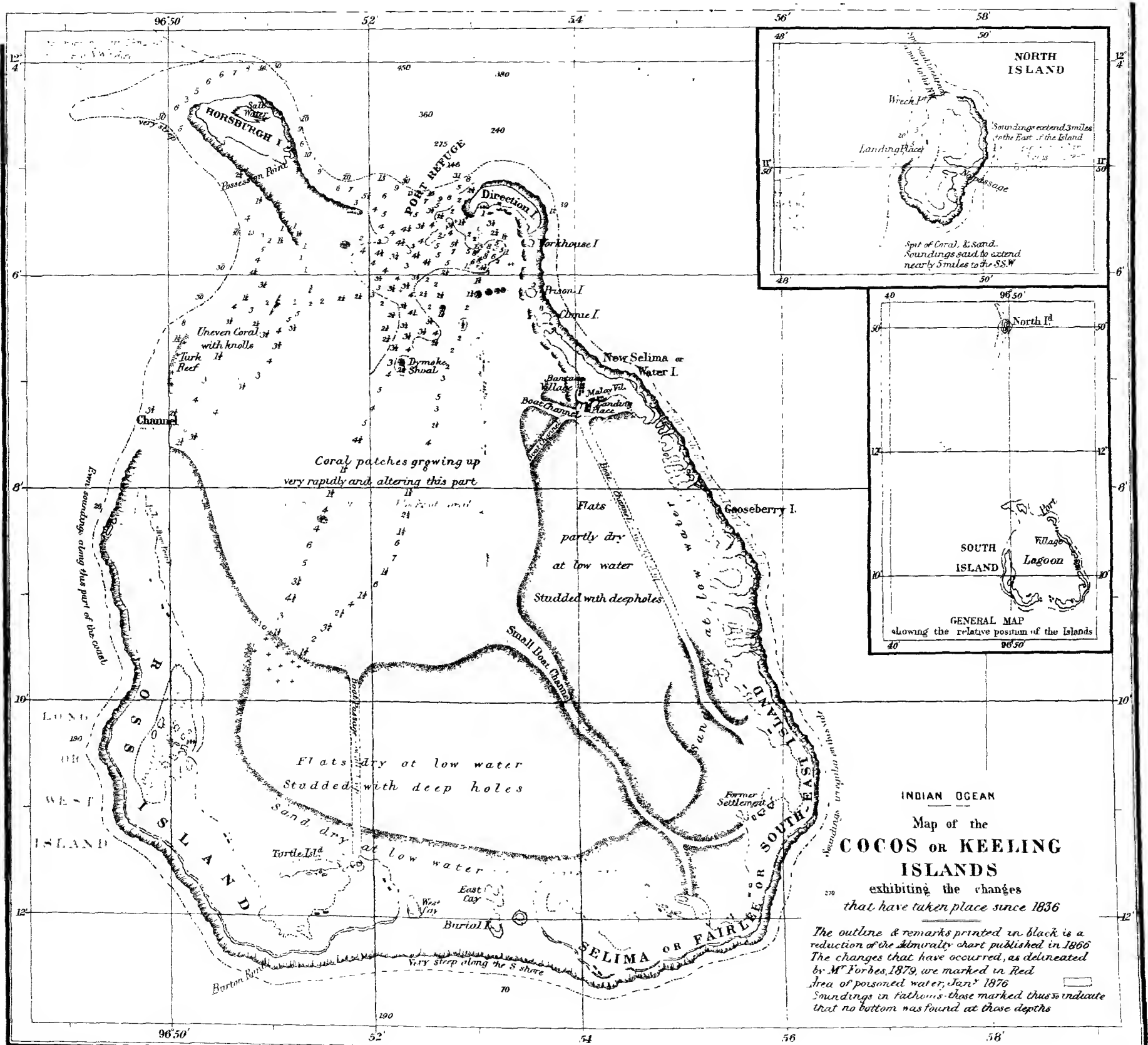
Musschenbroek, Mr. S. C. J. W. Van.—Kaart met Toelichting van de Bocht van Tomini of Gorontalo en Aangrenzende Landen, De Reeden, Afvoerplaatsen, Binnenlandsche wegen en Andere Middelen van Gemeenschap. Samengesteld door Mr. S. C. J. W. Van Musschenbroek, Oud-Resident van Menado, 1879. Amsterdam, C. J. Brinkman, 1879. (*Dulau.*)

Serné, S. H.—Algemeene Kaart van Nederlandsch Indië door S. H. Serné. 1879. C. L. Brinkman, Amsterdam. Scale 1 : 4,000,000 or 55·5 geographical miles to an inch. 4 sheets. (*Dulau.*)

This is a four-sheet map, lithographed and coloured ; it has been brought up to the present date, and is chiefly constructed from the Atlas of the Netherlands Indies in 60 sheets, the work of P. Baron Melvill van Carnbée, and Herr W. F. Versteeg, the coast-line being taken from the most recent English and Dutch charts. It contains inset maps of the following places :—The Highlands of Padang, 1 : 600,000 or 8·1 geographical miles to an inch ; Central Sumatra, 1 : 2,000,000 or 27 geographical miles to an inch ; the Kei Islands ; a plan of Batavia and its environs on the scale of 1370 yards to an inch ; a plan of the Telegraph network of Java ; a plan of the Residency of Manado, 1 : 900,300 or 16·5 geographical miles to an inch ; a plan of Amboina and the neighbouring Islands 1 : 900,300 or 16·5 geographical miles to an inch ; Banda Island on the scale of 2740 yards to an inch ; a map of the Netherlands on the same scale as the large map, 1 : 4,000,000. Much information as to the Physical and Political geography of the Netherlands Indies is given in a tabulated form, while the map itself is a very good specimen of cartography.

EDUCATIONAL.

Kiepert, H., and C. Wolff.—Historischer Schul-Atlas zur alten, mittleren und neueren Geschichte. 36 coloured maps ; large 4to. D. Reimer, Berlin. 1879. (*Dulau.*)

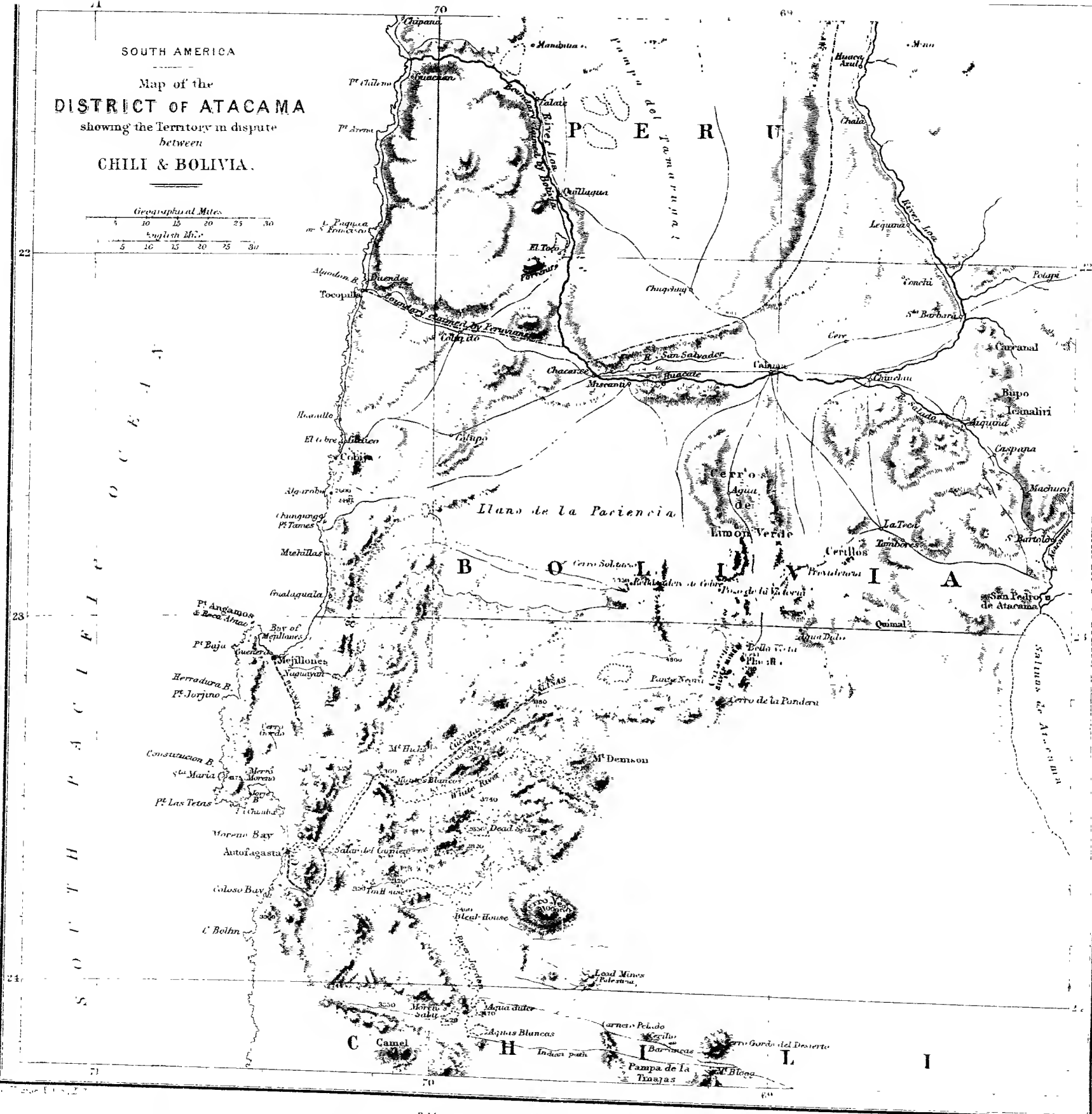


W. J. Turner R. O. S. Del.

SOUTH AMERICA

Map of the
DISTRICT OF ATACAMA
showing the Territory in dispute
between
CHILI & BOLIVIA.

Geographical Miles
5 10 15 20 25 30
English Miles
5 10 15 20 25 30



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